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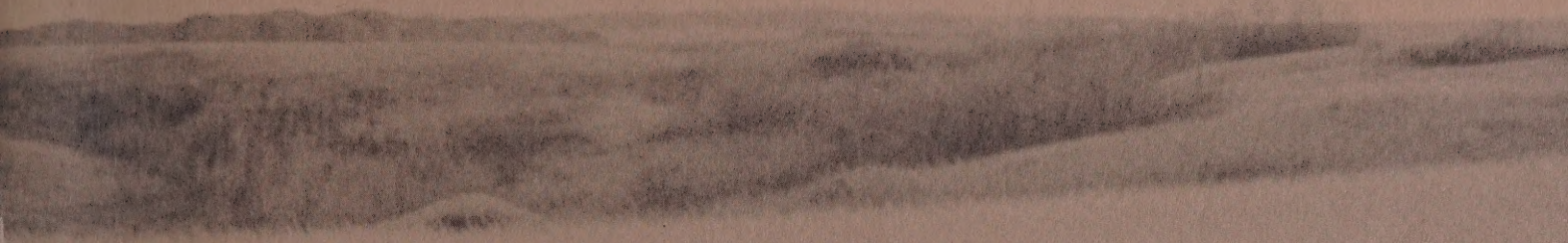

FORT UNION COAL

SOUTH WIBAUX-BEACH TRACT

SEPTEMBER 1981

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1981

FORT UNION COAL REGION

SOUTH WIBAUX-BEACH TRACT ANALYSIS

SITE SPECIFIC ANALYSIS

PRELIMINARY FACILITY EVALUATION REPORT

GOLDEN VALLEY COUNTY, NORTH DAKOTA

and

WIBAUX COUNTY, MONTANA

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September 1981

Michael J. Penfold
State Director

PREFACE

This document contains a site-specific analysis and a preliminary facility evaluation report. The site-specific analysis discusses the consequences of leasing and mining a particular tract. The preliminary facility evaluation report discusses significant issues associated with an end use coal conversion facility.

There were 24 tracts identified through a screening process under the over-all direction of the Fort Union Region Coal Team. The team consists of federal, state, and local officials. The tracts are being evaluated for potential federal coal leasing for a coal lease sale scheduled for June 1983. The evaluation, called a site-specific analysis, has been completed for each of the 24 tracts.

Historically, development of a new coal mine in the Fort Union Coal Region has been associated with a coal conversion facility power plant in the vicinity of the mine. For this reason, the Regional Coal Team directed BLM to evaluate impacts of a typical facility near each potential mine. A preliminary facility evaluation report was prepared for each facility.

The Fort Union Regional Coal Team will begin ranking and grouping selected tracts into alternative leasing patterns for the 1983 lease sale using information from these individual reports. These groupings of tracts will form the basis for alternatives and a regional environmental impact statement to be developed during 1982. The analysis in this report represents an important step in a lengthy process which takes place prior to any final decision on federal coal leasing within the region.

Of the 24 tracts currently being evaluated, 16 would require the opening of new mines. One of the 16 would be specifically earmarked for small business. The remaining eight tracts constitute coal which would be needed to maintain production or prevent the by-pass of federal coal at an ongoing mining operation.

Approximately 1.6 billion tons of recoverable federal coal lie within the areas being evaluated. Final designation of some areas as unsuitable for mining under the 1977 Surface Mining Control and Reclamation Act will likely reduce the amount of federal coal actually available for leasing and development, and could remove several of the 24 tracts from further consideration. This information will not be available until early 1982.

A major purpose of the site-specific analysis and preliminary facility evaluation reports is to acquaint the public with key issues and consequences of leasing and development of federal coal reserves so that they may (1) offer comments to the Fort Union Regional Coal Team on what areas they consider most important to be evaluated and analyzed in the ranking of the tracts and in the Regional EIS and (2) offer specific advice on what decision alternatives the Coal Team should look at more closely.

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SITE SPECIFIC ANALYSIS

SITE SPECIFIC ANALYSIS

INTRODUCTION

The purpose of this action is to offer 135.4 million tons of federal strippable coal reserves that can be further considered for coal leasing and development to help meet the energy needs of the Nation.

This site-specific environmental analysis has been prepared for the South Wibaux-Beach tract (Map 1) in accordance with federal regulations (43 CFR 3420). Similar analyses have been written for other tracts of federal coal being considered for possible leasing in the Fort Union Coal Region. These documents will be used by the regional coal team in determining which tracts to recommend for leasing in 1983. If selected and leased, the South Wibaux-Beach tract will contribute 135.4 million tons of federal coal to the regional leasing target. A regional leasing target will be finalized in October 1981.

BACKGROUND

In September of 1979, the Dickinson District Bureau of Land Management (BLM) Office adopted the Golden Valley Management Framework Plan (MFP) for Golden Valley County, North Dakota. In December 1979, the Miles City District adopted the Redwater MFP for Dawson, McCone, Richland, and Wibaux counties in Montana. The land use planning process included identifying areas of high or moderate potential coal, applying unsuitability criteria, identifying resource trade-offs, and consulting with surface owners. As a result of that work, areas were identified that could be further considered for coal development. These areas are available for consideration for new competitive leasing, lease exchanges, and lease modifications.

Following land use planning, the BLM requested expressions of interest from industry. These expressions, along with other information, guided the U.S. Geological Survey (USGS) in delineating this tract. Results of that work are summarized in this document.

BLM Dickinson district staff inventoried the tract to determine the site-specific resource values and then analyzed potential environmental effects of coal development on this tract. Among other things, certain of the unsuitability criteria were further considered. New findings are reflected in this report.

Information from this and other site-specific analyses (SSA) will be used in the regional environmental impact statement (EIS). The EIS will analyze the site-specific and regional cumulative effects of coal development. In the EIS different combinations of tracts (alternatives) will be considered. As more information becomes available, preliminary tract boundaries could be modified.

After reviewing the analytical documents, public comments, and the recommendations of the regional coal team, the Secretary of the Interior will select specific tracts for the lease sale. The successful lessee will be required to submit a plan for mining and reclamation to the Office of Surface Mining (OSM) for review and approval within three years after leasing. In evaluating the plan, OSM will prepare a site-specific environmental assessment or EIS.

Tracts in the Fort Union Region are being considered for leasing in accordance with the federal coal management program adopted by the Secretary of the Interior in June 1979 based on the final environmental statement for federal coal management. Implementation procedures are contained in Title 43, Code of Federal Regulations, Part 3400 (43 CFR 3400). Authorizing actions are the Mineral Leasing Act of 1920, as amended; The Mineral Leasing Act for Acquired Lands of 1947, as amended; the Federal Land Policy Management Act of 1976; the Surface Mining Control and Reclamation Act of 1977; the Multiple Mineral Development Act of 1954; the Department of Energy Organization Act of 1977; the National Environmental Policy Act of 1969; the Federal Coal Leasing Amendments Act of 1976, as amended; and federal regulations concerning federal coal leasing and development, including 43 CFR 3400, 30 CFR 211, and 30 CFR 700-899.

TRACT DELINEATION REPORT SUMMARY

South Wibaux-Beach tract is located in Golden Valley County, North Dakota and Wibaux County, Montana. It is located about three miles south and west of Beach, North Dakota (Map 1).

The tract is based on the Harmon bed found in the Sentinel Butte Member of the Fort Union Formation (Paleocene). No geologic hazards are know to exist on this tract.

For analytical purposes, the USGS developed a generic mine plan for the tract. This plan calls for a surface mine using draglines, electric coal loading shovels, bottom dump coal haulers, rotary drills, bulldozers, scrapers, and other support equipment. A possible mining sequence is shown in Map 2. The coal would be mined to a depth of 200 feet or until the limiting stripping ratio of 20:1 has been reached. The most probable end-use of the coal would be a synfuel plant.

PRELIMINARY TRACTS

Redwater and Golden Valley

KRCRA Areas

1 Circle

2 Burns Creek-
Thirteen Mile Creek

3 Southwest Glendive

4 Wibaux-Beach

Tract Delineation Areas

(1) Circle I

(2) Circle II

(3) Circle III

(4) Redwater I

(5) Redwater II

(6) Southwest Glendive

(7) Bloomfield

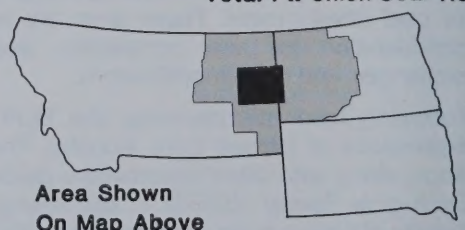
(8) Central Bloomfield

(9) Burns Creek

(10) North Wibaux-Beach

(11) South Wibaux-Beach

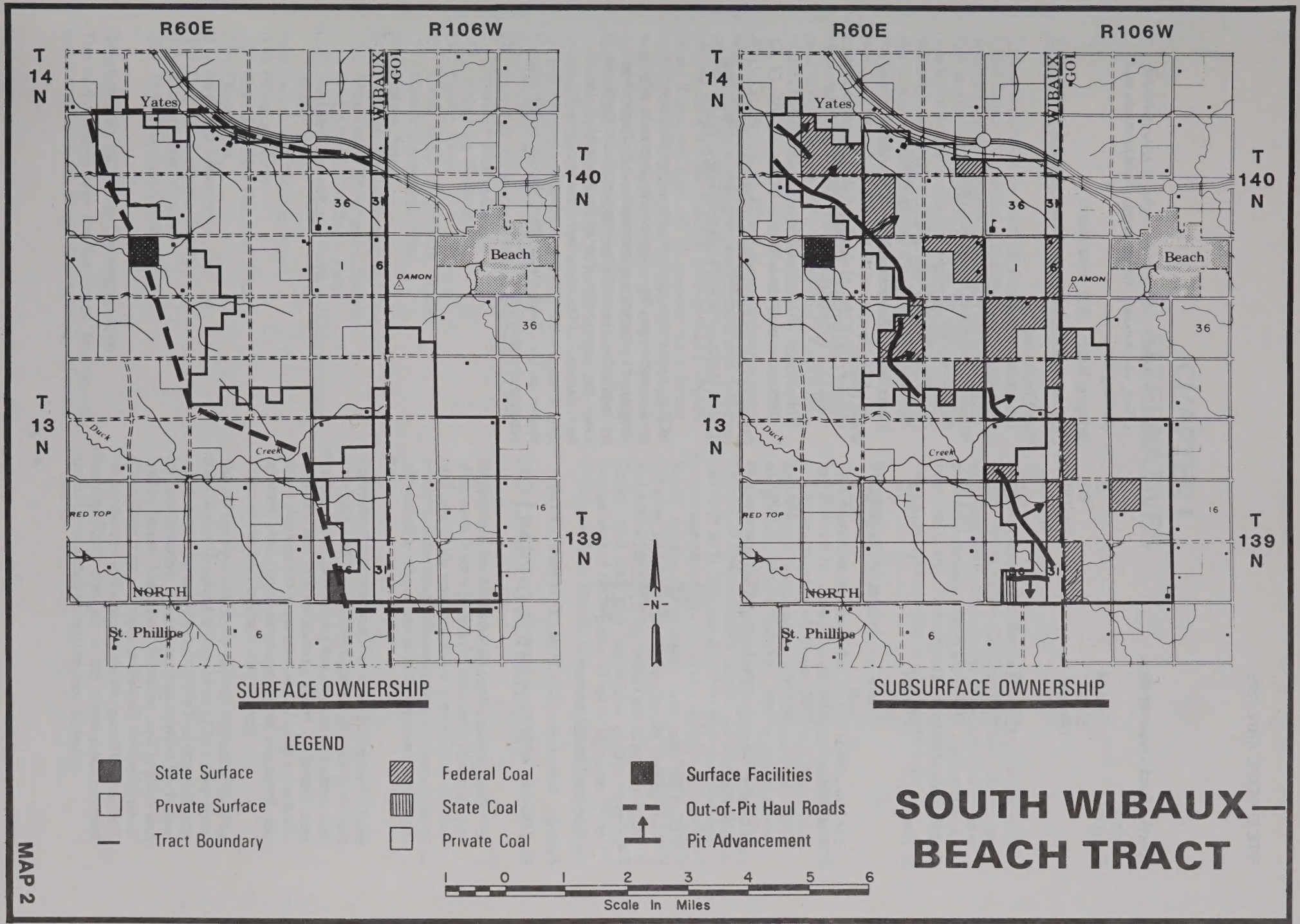
Total Ft. Union Coal Region



Area Shown
On Map Above

★ Savage Mine

MAP 1


R60E
R106W
T 14 N
T 140 N
T 13 N
T 139 N
Yates
WIBAUX
GOL
Beach
DAMON
Duck
Creek
RED TOP
NORTH
St. Phillips
36
31
1
6
16
SURFACE OWNERSHIP
SUBSURFACE OWNERSHIP
LEGEND
State Surface
Private Surface
Tract Boundary
Federal Coal
State Coal
Private Coal
Surface Facilities
Out-of-Pit Haul Roads
Pit Advancement
1 0 1 2 3 4 5 6
Scale In Miles
MAP 2
SOUTH WIBAUX—BEACH TRACT

Specific Tract Characteristics:

Acreage:

Surface:	Federal	0
	State	80
	Private	15,030
	Total:	15,110
Coal:	Federal	3,341
	State	320
	Private	11,449
	Total:	15,110

Coal Reserves/Millions of Tons:

In Place:	Federal	150.4
	State	4.7
	Private	507.0
	Total:	662.1
Recoverable:	Federal	135.4
	State	4.2
	Private	456.3
	Total:	595.9

Coal Quality: Average of samples as received from vicinity of tract:

Moisture	39%
Volatile matter	25%
Fixed carbon	26.2%
Ash	9.4%
Sulfur	1.1%
BTU's/lb	5,996

Surface Disturbance/acres

Mining: Annual rate, 327; Total Life of Mine, 13,719

Haul Roads: 205

Mine Facilities: 160 - may include: changehouse, office, warehouses, repair shed, storage areas, and parking lots.

Stripping Ratio: 20:1 (maximum)

Coal Thickness: 18 feet to 37 feet; average, 27.6 feet

Mine Employment:
Construction Phase - 175
Production Phase - 500

Annual Royalties and Severance Taxes:
Federal Royalty, $2.38 million
Montana Royalty, $0.07 million
Montana Severance Tax, $12.32 million.

North Dakota Severance Tax, $3.52 million

Water Needs:
Human Consumption, 15,000 gal./day
Source: Well water

Nonpotable, 120,000 gal./day
Source: Yellowstone River

For more specific information on the proposed mining operation refer to the Engineering, Geologic, and Land Reports prepared by the Tract Delineation Team.

NOTE: As the mine plans developed by USGS are of a generic nature and the actual mining sequence will be developed by the mining companies to fit their individual needs, the resource specialist assigned to the SSAs made the assumption that all lands within the tract boundaries would be disturbed to some degree. Therefore, acreage in the SSA may not always agree with that shown in the Tract Delineation Report concerning acreage disturbance.

CHAPTER I
ALTERNATIVES

LEASING AND DEVELOPMENT

This alternative is to offer for further consideration 135.4 million tons of coal in the South Wibaux-Beach tract for competitive leasing. This tract has been identified as a logical mining unit for a 14.0 million ton per year surface mine having a 42-year mine life. The South Wibaux-Beach tract has been delineated within areas designated as acceptable for further consideration in the Golden Valley and Redwater MFPs adopted respectively in September 1979 and December of 1979. The tract does not include any lands for which the surface owner has filed a valid refusal to consent (to mining) prior to April 28, 1981. The tract has been fully cleared of unsuitability criteria numbers 1, 2, 4, 5, 6, 8, 10, 11, 12, 13, 16, 17, 18, 19 and 20 as defined in 43 CFR 3461. Criteria 7, 9, 14, 15 and 16 require further study. With the exception of criterion 3, all unsuitability criteria studies will be completed and fully applied before work begins on the final regional environmental impact study; if not, this tract will be dropped from further consideration. Criterion 3 will be deferred until mining and reclamation plans are submitted to the Office of Surface Mining and North Dakota Public Service Commission for final approval. Current unsuitability concerns are shown on Map 3. The following is a list of unsuitability criteria.

(1) Federal Land System
(2) Rights-of-Way and Easements
(3) Buffer Zones along R/W and Adjacent to Communities and Buildings
(4) Wilderness Study Areas
(5) Scenic Areas
(6) Lands Used for Scientific Studies
(7) Historic Lands and Sites
(8) Natural Areas
(9) Federally Listed Endangered Species
(10) State Listed Endangered Species
(11) Bald and Golden Eagle Nests
(12) Bald and Golden Eagle Roost and Concentration Areas
(13) Falcon Cliff Nesting Sites
(14) Migratory Birds
(15) State Resident Fish and Wildlife
(16) Floodplains
(17) Municipal Watersheds
(18) National Resource Waters
(19) Alluvial Valley Floors
(20) State Proposed Criteria

Relationship to Other Developments

The tract contains three inactive mines. The nearest active mine is Knife River's Savage Mine, 40 miles northwest of the tract. The tract lies just to the east of the inactive Wibaux Basin Oil and Gas Field. Oil and gas exploration is on the increase in the area. It is possible that some recently drilled wells in the general area are now producing. Farming and ranching are the only other significant activities in or near the tract.

Mitigation Measures

This alternative assumes that proper mining and reclamation will be carried out according to existing state and federal regulations. These include: Office of Surface Mining Reclamation and Enforcement (OSM) regulations (30 CFR 700-899), Environmental Protection Agency (EPA) regulations (40 CFR 0-1399), Council of Environmental Quality (CEQ) regulations (40 CFR 211), Department of Interior coal management regulations (43 CFR 23 and 3400), North Dakota Public Service Commission laws and regulations (Chapter 38-14.1 of the North Dakota Century Code and Article 69-05.2 of the North Dakota Administrative Code), and laws and regulations of the Montana Department of State Lands (Title 82, Chapter 4, Part II-MCA and ARM, Title 26, Chapter 4, Subchapter 3-18).

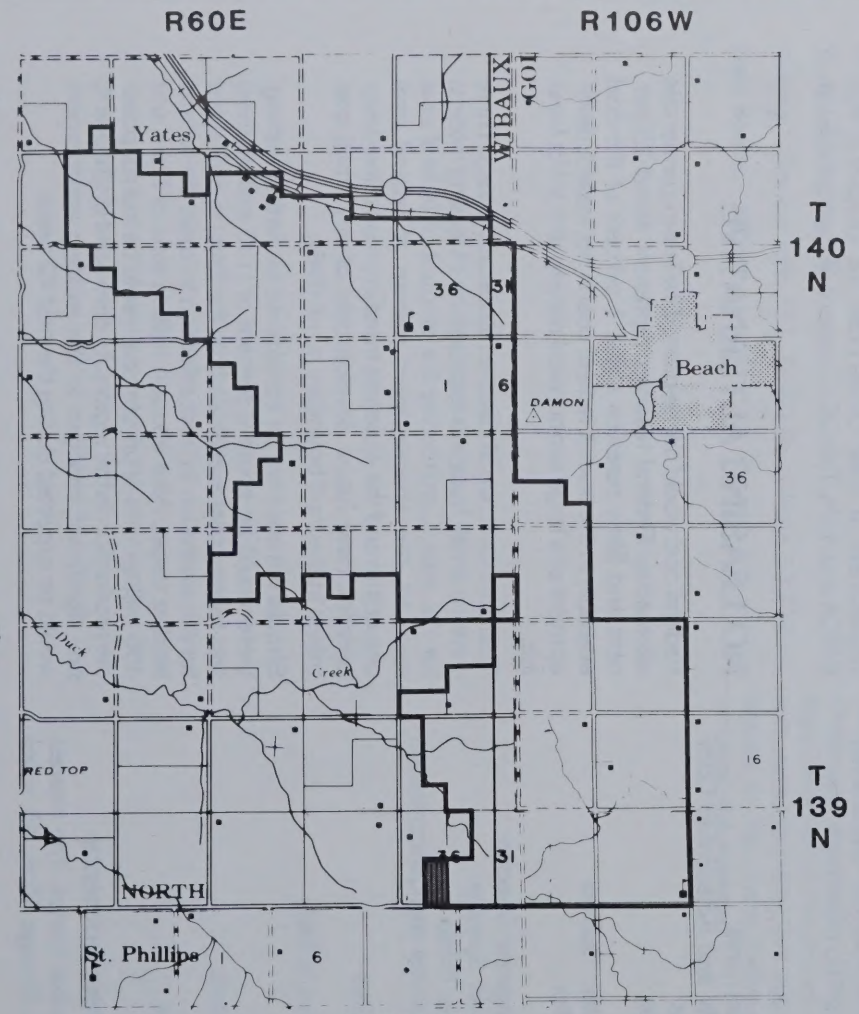
NO LEASING ALTERNATIVE

Federal coal would not be offered for leasing under this alternative. Federal reserves represent about 23 percent and State reserves about 1 percent of the coal available in the tract. If federal coal is not leased, development of a large economical mining unit is not feasible.

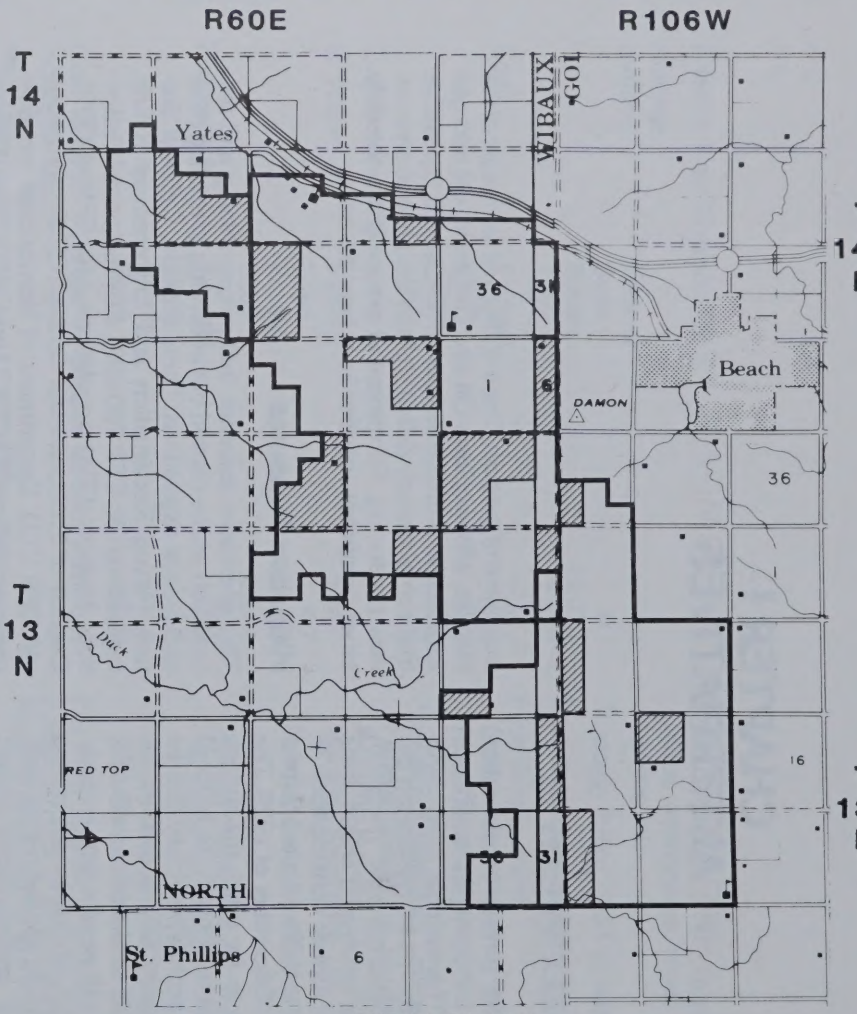
There are three small inactive mines on the tract. There were no small business expressions of leasing interest for the area. Considering the amount of federal coal involved, the checkerboard pattern of federal coal ownership and the apparent trend in small mine development, near future development of any small coal mines in the tract boundary is not likely.

Should the tract not be considered for further leasing, there would be about 9 percent or (135 million tons) less federal coal available within the Fort Union Region for consideration in tract selection to meet the federal leasing target. Also about 4 million tons of State and 456 million tons of private coal would be lost for possible production in the region. As discussed in Chapter II, few significant changes to the existing environment would be expected during the next 42 years.

MAP 3



SURFACE



SUBSURFACE

LEGEND

- State Surface
- Private Surface
- Tract Boundary
- Federal Coal
- State Coal
- Private Coal

1 0 1 2 3 4 5 6
Scale In Miles

SOUTH WIBAUX— BEACH TRACT

CHAPTER II
AFFECTED ENVIRONMENT

This section is a description of the current environment with anticipated changes from ongoing trends. Within the Williston Basin there has been an increase in oil and gas exploration and this trend is expected to continue. The physical resources described in this section represent only existing conditions, while the social and economic sections account for existing conditions and ongoing trends. It is recognized that the physical resource values may change due to future oil and gas exploration.

TOPOGRAPHY

The Wibaux-Beach area is located in the Great Plains physiographic province. The tract is made up of unglaciated, semi-arid hills (with a relief of about 100 feet) that are drained by Duck and Beaver Creeks to the south and west.

GEOLOGY AND MINERALS

The tract is underlain by the interbedded sandstone, siltstone, claystone, and lignite beds of the Tongue River Member of the Paleocene Fort Union Formation.

The Harmon bed is the only economical coal bed in the tract. It varies in thickness from 18 to 37 feet and ranges in depth from 0 to 191 feet, averaging 85 feet. The Hansen coal bed, generally less than 5 feet thick and more than 50 feet below the Harmon bed, is not considered economical. The tract contains about 662 million tons of in-place reserves.

About 16 million tons of federal coal in scattered parcels would be bypassed because the parcels do not fall within the areas acceptable for further consideration identified in the MFP.

The abandoned Wibaux Oil Field lies just west of the tract. The field, discovered in 1954, had a cumulative production of 35,557 barrels of oil. New exploration is occurring in and around the abandoned field. Recent information indicates that a well drilled on the South Wibaux-Beach tract may be a producing well. Recently drilled wells outside the tract may also be producers.

PALEONTOLOGY

No fossils of scientific importance are known to occur on this tract.

SOILS AND RECLAMATION POTENTIAL

The soils of the South Wibaux-Beach tract are primarily derived from shale and sandstone parent material. A few are from alluvial deposits of recent origin. Most of the soils are on nearly level to gently rolling uplands. The soils are generally of good quality and are being used primarily for wheat farming.

Table 1 gives the mapping units found within the tract, based on SCS Order II county soil surveys. The percent slope column reflects the gentle topography over most of the unit.

The soil erosion potential column indicates that many of the moderately coarse and silty surface textured soils are quite susceptible to wind erosion. Over most of the tract, water erosion potential is low to moderate. Soils with a high water erosion potential are generally associated with steeper slopes.

The presence of good quality soil within the tract is reflected in the column showing suitability for final cover on surface mined land. By planimetric measurement of the acreages of soil mapping units according to their rating, it was determined that about 72% (10,911 acres) of the tract is in the "good" suitability category, 22% (3,361 acres) is "fair" and 6% (838 acres) "poor". The last column of Table 1 gives limiting factors for mapping units rated in the latter two categories. A tabulation of acreage in each of the three categories mentioned above appears in Table 2. The data is presented by landowners because North Dakota law does not allow the transfer of soil material from one landowner to another. Unless consenting landowners agree in writing to waive this requirement, their land must be reclaimed with soil originally removed from their respective holdings. Table 2 can, therefore, be used to indicate the degree of difficulty to reclaim individual landowner holdings, based on soil suitability for cover of surface-mined land.

HYDROLOGY

Surface water runoff drains from this tract through Duck Creek, Little Beaver Creek, and four other unnamed creeks into Beaver Creek which then flows into the Little Missouri River. Annual runoff in this area averages about 0.75 inches. A portion of this tract has no external surface drainage and supports ephemeral, temporary, and perennial wetlands. Table 3 shows the percentage of watershed areas covered by the tract, plus the additional areas affected by facilities, haul roads, etc. Also shown are estimates of surface water yield.

TABLE 1
SOUTH WIBAUX-BEACH TRACT - SOILS

Map Symbol and Soil Mapping Unit Name[1/]	Percent Slope[1/]	Soil Erosion Potential[1/] Wind	Water	Overall Suitability of Soil for Use as Cover-Soil Material in Surface-Mine Reclamation[2/]	Soil Hazard Conditions[2/]
Aa - Variable; Havrelon (loamy); Lohler (clayey); Trembles (sandy)	0-1	Low	Low	Fair	Lohler part-too clayey; Trembles-some lime
Ab - Arnegard silt loam	0-2	Mod	Low	GOod	----
Bb - Cambert silt loam	6-9	High	High	Good	----
Bd - Cabba silt loam	15-40	High	High	Fair	Too alkaline
Ca - Chama silt loam	4-7	Mod-High	Mod	Good	----
Cd - Chama-Cambert silt loams	4-9	Mod	Mod	Good	----
Ce - Chama-Cambert silt loams	10-14	Mod	High	Good	----
Fa - Farland silt loam	0-3	Mod	Low	Good	----
Fb- Farland-Harlem complex	0-3	Mod	Low	Fair	Harlem part-too clayey
Fc - Dast loamy fine sand	4-9	High	Mod	Fair	Too sandy; droughty
Fd - Flasher loamy fine sand	10-14	High	Mod	Poor	Too sandy; droughty
Ma - McKenzie-Adger silty clays	0-1	Low	Low	Poor	Too clayey; too alkaline; excess salt and Na
Me - Dimyaw-Regent silty clay loams	3-7	Mod	Mod	Fair	Too clayey
Mg - Dimyaw-Regent silty clay loams	8-11	Mod	Mod	Fair	Too clayey

TABLE 1
SOUTH WIBAUX-BEACH TRACT - SOILS

Map Symbol and Soil Mapping Unit Name[1]	Percent Slope[1]	Soil Erosion Potential[1] Wind	Water	Overall Suitability of Soil for Use as Cover-Soil Material in Surface-Mine Reclamation[2]	Soil Hazard Conditions[2]
Mn - Morton silt loam	4-7	Mod	Mod	Fair	Too clayey, excess lime
Mo - Morton-Arnegard silt loams	0-3	Mod	Low	Good	----
Mp - Morton-Chama silt loams	4-9	Mod	Mod	Fair	Too clayey, excess lime
Sa - Savage silty clay loam	0-3	Mod	Low	Fair	Too clayey
Sc - Searing loam	3-7	Mod	Mod	Good	----
Vb - Vebar fine sandy loam	4-7	High	Low	Good	----
Vc - Vebar fine sandy loam	8-14	High	Mod	Good	----
Vd - Vebar-Flasher complex	3-9	High	Low-Mod	Good	----
Ve - Vebar-Manning fine sandy loams	0-3	High	Low	Good	----
Wb - Brandenburg stony loam	10-40	Low	High	Poor	Excess rock fragments
4 - Grassna silt loam	1-3	Low	Low	Good	----
9D - Cabba silt loam	9-15	Mod-High	Mod-High	Fair	Too alkaline
20 - Chama silt loam	1-3	Mod-High	Low	Good	----
20B - Chama silt loam	3-6	Mod-High	Mod	Good	----

TABLE 1
SOUTH WIBAUX-BEACH TRACT - SOILS

Map Symbol and Soil Mapping Unit Name[1/]	Percent Slope[1/]	Soil Erosion Potential[1/] Wind	Water	Overall Suitability of Soil for Use as Cover-Soil Material in Surface-Mine Reclamation[2/]	Soil Hazard Conditions[2/]
21C - Chama-Cabba silt	3-9	Mod-High	Mod-High	Fair	Too alkaline
26 - Dimmick silty clay	0-1	Low	Low	Poor	Too clayey
37 - Golva silt loam	1-3	Low	Low-Mod	Good	----
37B - Golva silt loam	3-6	Low	Mod	Good	----
41 - Grail silty clay loam	1-3	Low	Low	Fair	Too clayey
55 - Stady loam	1-3	Low-Mod	Low	Good	----
55B - Stady loam	3-6	Low-Mod	Low-Mod	Good	----
55C - Lehr loam	6-9	Mod	Mod	Good	----
88 - Sen silt loam	1-3	Low-Mod	Low	Good	----
88C - Sen silt loam	6-9	Low-Mod	Mod	Good	----
89 - Shambo loam	1-3	Low	Low	Good	----
97B - Vebar-Tally fine sandy loams	1-6	High	Low	Good	----
97C - Vebar-Tally fine sandy loams	6-9	High	Low-Mod	Good	----
98B - Vebar variant fine sandy loam	3-6	High	Low	Fair	Too sandy
109 - Amor loam	1-3	Low	Low-Mod	Good	----

TABLE 1
SOUTH WIBAUX-BEACH TRACT - SOILS

Map Symbol and Soil Mapping Unit Name[1/]	Percent Slope[1/]	Soil Erosion Potential[1/] Wind	Water	Overall Suitability of Soil for Use as Cover-Soil Material in Surface-Mine Reclamation[2/]	Soil Hazard Conditions[2/]
109B - Amor loam	3-6	Low	Mod	Good	----
114 - Regan variant silt loam	0-3	Low	Low	Poor	Excess salt
118 - Golva soils, channeled	0-1	Low	Low-Mod	Good	----

1/ From "Soil Survey West-Central Area Golden Valley County" and "Soil Survey Wibaux County, Montana."

2/ Derived by applying the properties of the soils within the tract which are described in the above mentioned soil survey reports and "Official Soil Series Descriptions" to the guidelines developed by BLM-Montana State Office and adapted from information by W.M. Schafer, the Soil Conservation Service (SCS), and the Office of Surface Mining (OSM).

TABLE 2
SUITABILITY OF SOIL FOR RECLAMATION BY
LANDOWNER IN THE SOUTH WIBAUX-BEACH TRACT

LANDOWNER NUMBER	ACRES GOOD	FAIR	POOR	TOTAL
1.	80	10	30	120
2.	64	16		80
3.	24		16	40
4.	100	70		170
5.a.	40	120		160
b.	113	6	41	160
c.	25	35		60
d.	240			240
e.	95	22	43	160
6.	150		10	160
7.a.	109		11	120
b.	63	11	6	80
8.	65	15		80
9.	567	70	43	680
10.a.	130	30		160
b.	56	44		100
c.	88	2	60	150
d.	299	21		320
e.	30	130		160
11.	149	171		320
12.a.	132		28	160
b.	142	9	9	160
13.a.	46	4		50
b.	99	55	6	160
14.	214	46		260
15.	133	27		160
16.	159		1	160
17.a.	262	15	43	320
b.	79		1	80
18.a.	147	13		160
b.	17	299	4	320
19.	80			80
20.a.	15	4	21	40
b.	160			160
21.	341	162	17	520
22.	184	7	129	320
23.	12	148		160
24.	132	4	24	160
25.	271	49		320
26.	319	1		320
27.a.	313	6	1	320
b.	313	95	32	440
28.	84	76		160
29.	100			100
30.	137	4	19	160
31.	82	226	12	320
32.	116	17	27	160
33.	40			40
34.	34	6		40
35.	106	306	68	480
36.	579	61		640
37.	58	16	6	80
38.	125	35		160
39.a.	273	377	6	620
b.	19	14	7	40
40.	159	1		160
41.	86	71	3	160
42.	65	3	12	80
43.	190	250		440
44.	76		4	80
45.	155		5	160
46.	118		2	120
47.	160			160
48.	152	85	3	240
49.	148	12		160
50.a.	380	7	13	400
b.	465	34	61	560
51.	903	43	14	960
52.	80			80
TOTALS	10,911	3,361	83	15,110
% OF TOTAL	72%	22%	6%	100%

[1]Based on Table 1 Planimetry by BLM. Legal description of land and owner name corresponding to landowner number available at Dickinson District Office. Landowner holdings that are not contiguous are depicted separately by small letters.

TABLE 3
WATERSHED AREAS ON THE
SOUTH WIBAUX-BEACH TRACT

Watershed	Area (miles²)	% of Watershed to be Disturbed	Annual Water Yield (acre-feet)
Duck Creek	44.6	35.4	1,784
Unnamed Creek 1	7.8	49.0	310
Unnamed Creek 2	3.3	37.1	130
Unnamed Creek 3	2.2	35.7	93
Unnamed Creek 4	22.4	27.8	897
Little Beaver Creek	96.2	0.1	3,848
Closed Basin	1.9	100.0	—
Beaver Creek at Wibaux	351.0		8,515,912
Beaver Creek at Trotters	485.0		6,221,987

The surface water is typically a sodium sulfate type. The only surface water use within the affected area is five stockwater ponds. Downstream on these watersheds there are some other stockponds.

In ascending order above the Pierre Shale, the Fox Hills-Hell Creek, Ludlow, Lower Tongue River, and Harmon Lignite are aquifers that occur beneath this tract. The Lower Tongue River and Harmon Lignite aquifers occur within the mine disturbance zone.

The Harmon lignite bed acts as an aquifer which will yield at least two to five gallons per minute almost everywhere. Water movement is northeasterly from the outcrop of this bed on the west side of the tract. This tract is located in the recharge area for the local Harmon Lignite system.

The Lower Tongue River aquifer is located from 10 to 200 feet below the Harmon Lignite aquifer. Water moves in a northerly direction under a shallow gradient. Vertical movement is downward between all of the major aquifer zones. Recharge to the Lower Tongue River aquifer occurs through the interburden between it and the Harmon Lignite aquifer. The Lower Tongue River aquifer is also recharged along its outcrop area somewhat to the west of the Harmon Lignite outcrop. The coal tract is located in a recharge area for the Lower Tongue River aquifer.

Table 4 shows a water quality summary for the Harmon Lignite. The quality of the Lower Tongue River aquifer is similar to the Harmon Lignite aquifer.

In and surrounding the tract, groundwater is used for domestic, stock watering, and municipal purposes. There are about 51 farmsteads in and surrounding this tract. Assuming there are 1.5 wells per farmstead, there are about 77 water wells in the general vicinity of the tract. The city of Beach has six wells for municipal supplies. During most of the year, one deep well is sufficient for the city's needs, but during the lawn sprinkling season shallower wells are also pumped. The city has plans for one additional deep well to meet its growing water demand.

VEGETATION AND AGRICULTURAL PRODUCTION

The South Wibaux-Beach tract is extensively used for agricultural purposes. Acreages and average production figures are shown in Table 5.

TABLE 5
AGRICULTURAL LAND USE
ON THE SOUTH WIBAUX-BEACH TRACT

Land Use:	Tract Acres	Average Production Per Acre 1/	Total Annual Production
Cropland	7,907	29.4 bu.	232,466 bu.
Range	713	.5 AUM	357 AUMs
Other	2,251	1.25 tons	2,814 tons
Fallow	4,223	n/a	n/a
Total	15,094	n/a	n/a

1/ Crop : wheat equivalent bu./acre
Range: AUMs/acre
Other: Tons/acre of hay

Dryland farming methods, most notably alternate year summer fallow-cropping rotations, are widely practiced in the area. Twenty-eight percent of the total tract (4,223 acres, Wibaux County and Golden Valley County ASCS, 1980) is fallowed each year.

About 52 percent (7,907 acres) of the tract is cropped annually. Crops include hay, spring wheat, durum, winter wheat, oats, barley, and corn. This percentage does not include fallow acres. Wheat yields average 29.4 bushels per acre. Much of the cropland production, especially the wheat portion, is sold as a cash crop. Oats, barley, and corn are also used as feed grains in livestock operations. The hay is used for overwinter livestock feeding. Approximately 1.25 tons of hay are produced per acre.

Five percent (713 acres) is rangeland and pastureland. Rangeland produces about .5 Animal Unit Months (AUMs) per acre. An AUM is the amount of forage needed to support a cow/calf pair for one month. Beef

TABLE 4
WATER QUALITY OF THE HARMON LIGNITE AQUIFER
ON THE SOUTH WIBAUX-BEACH TRACT

	Na (mg/l)	Ca (mg/l)	Mg (mg/l)	SO_4 (mg/l)	Alk. (mg/l)	TDS (mg/l)	SAR	pH
Median	520	19	13	770	659	1755	27	8.1
Maximum	950	590	720	4400	1210	6170	51	8.9
Minimum	6	5	0	54	130	412	0.1	5.9

cattle are the predominant kind of livestock (North Dakota Crop and Livestock Reporting Service 1980 and Montana Crop and Livestock Reporting Service 1978-1979). There are also some dairy cattle, hogs, and sheep.

There are approximately 20 acres of shelterbelts, field windbreaks, and farmsteads per operation. There is a small amount of native wooded areas in the tract.

Native rangeland is classified as a Mixed Grass Prairie type (Shaver, J.C. 1977). This includes species such as needle and thread, little bluestem, prairie sandreed, western wheatgrass, blue grama, side-oats grama, plains muhly, sedges, snowberry, fringed sagewort, and silver sage.

No threatened or endangered plant species, as published in the 1980 Federal list, have been identified within the tract.

There are 36 operators and operator partnerships in the tract (Table 6). Operations range in size from 40 acres to 1,980 acres inside the tract and from 160 acres to 16,472 acres for the total operations.

Agriculture in the region includes crop operations, livestock operations, and combinations of both. Most operations in the tract include a balance between crops and livestock.

Seventy-two percent of the operations have less than 30 percent of their operations within the tract. Several of the predominantly crop operations have a high percentage of their land within the tract. Overall, the tract covers 17 percent of the acreage of the operations involved.

Sixty-one percent of the acreage within the tract is farmed by operators who do not own the land. Thirty-nine percent is farmed by owner/operators.

AGRICULTURAL ECONOMICS

This section will be forthcoming under separate cover.

LAND USE

Agriculture is the primary use of the tract area, as described elsewhere in this document. Livestock grazing of prairie is a very minor use. The tract also includes county roads and the other minor roads along section lines, local utility lines (generally adjacent to roadways), a 230 KV power line and substation on the southern portion of the tract, and a Montana-Dakota natural gas line.

Interstate Highway 94, State Highway 16, and State Highway 7 run close to the boundary of the tract and an airport is close to the east boundary of the tract.

Interest has been shown in the area for oil and gas development, but to date this interest has been minimal.

RECREATION

Hunting of a variety of native species (deer, upland game birds, waterfowl) is the only recreational opportunity offered to the public on the tract. This opportunity, while significant to local people, attracts few people outside the immediate vicinity of the proposed mining.

The communities of Beach, North Dakota and Wibaux, Montana offer recreational opportunities in the general vicinity of the tract. Wibaux has playground, softball, parks, and swimming pool opportunities. Beach has the same kind of opportunities, and in the case of both communities, these resources are used to capacity.

AESTHETICS

The South Wibaux-Beach tract is visible intermittently from both eastbound and westbound lanes of Interstate Highway 94. These views include sizeable portions of the tract. The tract is not appreciably visible from Wibaux and would be screened by intervening land forms in much of the Beach area.

The tract area has little value as scenery because it is typical and common in the region.

WILDLIFE

Important wildlife habitat is composed of agricultural lands, limited native prairie, about 400 acres of pothole wetlands, numerous intermittent streams, and some farm shelterbelts. The extensive (estimated at 85%) farming acreages and method of farming leaves very little vegetative habitat for wildlife. Small grain stubble, hay crops, and other grains provide limited nesting and winter cover.

There are few primary drainages in the area. Soil, groundwater, and surface water salinity is high; and annual precipitation is low, which limits wildlife habitats and species. The harsh winter wind and low temperatures are responsible for the low populations of various species which require a ready source of food and thermal protection for overwinter survival.

Whitetail and mule deer are generally found along the major streams, on upland farming areas, and native prairie. The limited woodlands provide critical fawning and winter habitats. Both species are common to the area.

TABLE 6

FARM/RANCH OPERATIONS - SOUTH WIBAUX-BEACH TRACT

	INSIDE COAL TRACT (ACRES)						OUTSIDE COAL TRACTS (ACRES)						
OPERATOR	SMALL GRAIN & HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	PERCENTAGE OF TOTAL ACRES LEASED	SMALL GRAIN & HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	GRAND TOTAL	PERCENTAGE OF TOTAL ACRES IN TRACT
1	8	13	7	12	40	100	44	42	34	0	120	160	25
2	462	0	308	36	806	100	2761	1412	872	130	5175	5981	13
3	36	0	27	17	80	100	185	0	114	21	320	400	20
4	424	78	219	64	785	20	95	6	39	0	140	925	85
5	244	32	90	154	520	77	2086	1404	522	34	4046	4566	11
6	398	0	170	110	678	100	194	0	194	13	400	1078	63
7	145	104	0	71	320	100	10,799	4518	835	0	16,152	16,472	2
8	540	14	266	140	960	100	427	30	363	8	828	1788	54
9	1272	112	572	24	1980	28	808	104	688	20	1620	3600	55
10	236	0	0	84	320	0	991	36	557	16	1600	1920	17
11	183	0	163	73	419	0	570	568	142	0	1280	1699	25
12	206	0	182	90	478	33	519	190	202	49	960	1438	33
13	224	44	106	26	400	0	76	0	0	0	76	476	84
14	180	17	0	5	202	0	513	360	190	17	1080	1282	16
15	185	0	185	70	440	100	1613	316	988	70	2987	3427	13

TABLE 6

FARM/RANCH OPERATIONS - SOUTH WIBAUX-BEACH TRACT

	INSIDE COAL TRACT (ACRES)						OUTSIDE COAL TRACTS (ACRES)						
OPERATOR	SMALL GRAIN & HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	PERCENTAGE OF TOTAL ACRES LEASED	SMALL GRAIN & HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	GRAND TOTAL	PERCENTAGE OF TOTAL ACRES IN TRACT
16	48	25	0	47	120	100	600	500	300	0	1400	1520	8
17	137	6	91	86	320	100	2223	1620	999	68	4910	5230	6
18	85	0	36	39	160	0	450	49	300	1	800	960	17
19	429	19	211	261	920	100	590	172	377	41	1180	2100	44
20	261	8	260	112	641	75	325	190	140	0	655	1296	49
21	48	16	47	49	160	0	702	738	77	0	1440	1600	10
22	162	54	161	103	480	100	478	1768	392	42	2680	3160	15
23	66	2	66	106	240	100	599	1348	531	2	2480	2720	9
24	64	0	63	33	160	100	633	344	405	8	1390	1550	10
25	63	11	0	6	80	100	53	134	53	0	240	320	25
26	59	0	0	21	160	100	1327	698	442	549	2574	2654	3
27	103	1	0	57	160	0	1047	382	727	5	2161	2321	7
28	71	3	71	15	160	0	512	356	252	0	1120	1280	12
29	63	0	27	3	93	100	323	20	190	0	533	626	15
30	313	9	209	123	654	100	71	122	71	1	265	919	71

TABLE 6

FARM/RANCH OPERATIONS - SOUTH WIBAUX-BEACH TRACT

	INSIDE COAL TRACT (ACRES)						OUTSIDE COAL TRACTS (ACRES)						
OPERATOR	SMALL GRAIN & HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	PERCENTAGE OF TOTAL ACRES LEASED	SMALL GRAIN & HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	GRAND TOTAL	PERCENTAGE OF TOTAL ACRES IN TRACT
31	182	9	181	28	400	60	1090	103	726	69	1988	2388	17
32	58	0	57	5	120	100	514	23	513	29	1079	1199	10
33	310	74	133	0	517	100	2940	814	1583	0	5337	5854	9
34	472	62	277	149	960	0	42	180	18	0	240	1200	80
35	90	0	38	32	160	100	483	0	197	0	680	840	19
36	80	0	0	0	80	0	2081	1196	1507	96	4880	4960	2
TOTAL	7907	713	4223	2251	15,094	61	38,764	19,743	15,540	1289	75,336	90,430	17

Pheasants, Hungarian partridge, and dove are common to most of the farmed area, as well as the stream woodlands, and limited prairie. Waterfowl and shore birds are common migrants and breeding residents when spring wetlands are available.

There is a small overwintering population of pronghorn in the general area.

Raptors are found along the woodlands or major streams and around the cliffs of Beaver Creek. Farmland provides limited nesting habitat but considerable food.

Migrating whooping crane habitat is excellent in the area during spring flooding of grainfields and wetlands. This area is part of the whooper fall and spring migration route.

There are no significant fisheries within the immediate area, but there are significant fisheries values, population and habitat, off-site in the principal streams and the Little Missouri River.

Species in the area that have been designated as "sensitive" by the State of Montana are: Dakota toad, snapping turtle, spiny softshell turtle, meadow jumping mouse, and least weasel. Wildlife species considered as "sensitive" by the State of North Dakota include: plains spadefoot toad, shorthorned lizard, hognose snake, yellow-rumped warbler, and mountain cottontail. All above species have been observed in the general area, or suitable habitat exists for each. Numerous other species are designated as sensitive by the North Dakota Game and Fish Department.

CULTURAL RESOURCES

There are strong indications that both historic and prehistoric resources will be recorded from the tract when it is inventoried. To date, no systematic survey has been conducted; therefore, specific comments cannot be made.

Archaeological information has been collected from areas within a 20-mile radius of the tract. In these areas, human activity from prehistoric through historic time has been recorded. This activity is generally reflected in open plains sites that are task-specific and exploitative in nature (i.e., bison kill sites; lithic scatters of varying size, density, and function; and seasonal and long-term habitation sites).

There is a high probability of finding archaeological sites on the tract, because of its location between the Yellowstone and Little Missouri Rivers. In prehistoric times, travel would have been natural between the rivers. The same pattern is repeated in historic times. The trail of Sully's 1864 expedition and the 1876 trip of Custer to the Little Big Horn are examples. The modern routing of a major highway is another example.

The dominant human use of the area in the historic period has been farming. Stock raising has been a minor use. Most evidence of historic activity is oriented toward farming activity. This activity, which continues to the present time, has possibly eradicated cultural resources from earlier times.

ECONOMIC AND SOCIAL CONDITIONS

Existing and forecasted population and employment levels for the communities of Wibaux, Lambert, and Savage, Montana and Beach, Golva, and Sentinel Butte, North Dakota are shown in Figure 3 (Chapter III). As this figure shows, future population levels without federal coal leasing (refer to dashed line) are expected to either decline somewhat or remain relatively stable from 1981 through 2000.

These communities are small agriculturally oriented towns which do not have the capability to accommodate any significant population growth without some strain on public services. As Figure 1 shows, all of the above communities are presently (1981) experiencing problems providing an adequate or barely adequate level of some type of public services. For example, Beach, North Dakota currently has an inadequate water storage and distribution system for its present population.

The adequacy ratings appearing in Figure 1 reflect assessments by city-county planners, regional planners, and city and county planning and zoning commissions. It should be recognized that some assessments were based on best judgment and are somewhat subjective.

FIGURE 1

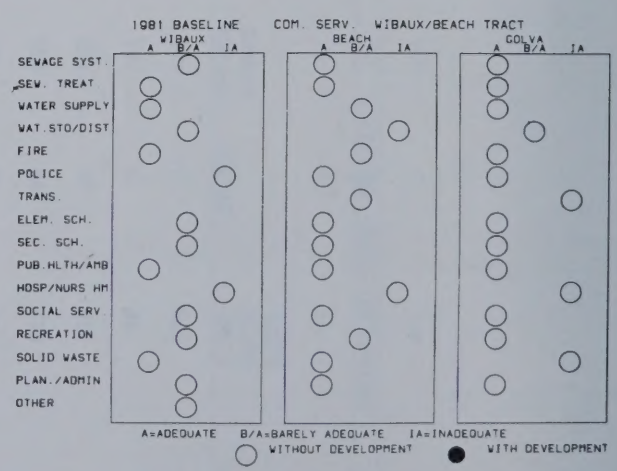
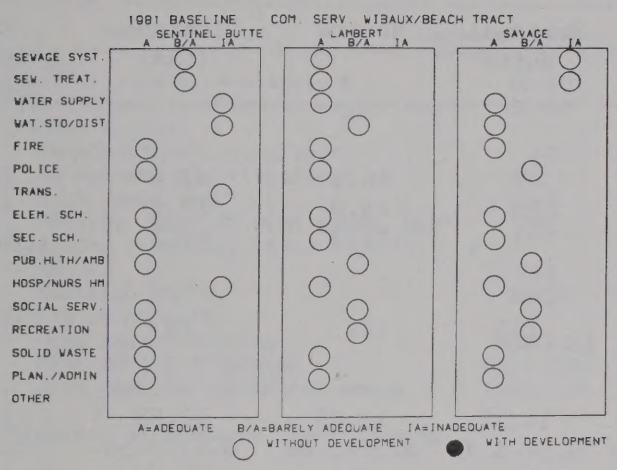


FIGURE 1 (continued)



SOURCE: Respective city/county or regional planners.

Medical care was identified, by a majority of those Wibaux County residents contacted by a BLM survey, as the county's most serious existing service problem. Services for the elderly and law enforcement were also mentioned as areas deserving more public attention and support. These reports are consistent with the evaluation of area planners.

In Golden Valley County, the other area where the bulk of the effects would occur, residents stated that elderly services, expansion of the school system, and improved retail opportunities are that county's greatest needs. The small number of residents contacted may account for differences between these comments and the evaluations of planning professionals.

Based on a total of 28 interviews in Wibaux and Golden Valley counties, it appears that people in Golden Valley County are generally more favorable toward mining in the area than are Wibaux County residents. In Golden Valley County, more than two-thirds of those persons contacted either unconditionally favored development or favored it if reclamation could be assured, surface water would not be jeopardized, and quality agricultural land would be protected. Other concerns mentioned were the effects of rapid growth on the communities, particularly the school systems, and fair compensation to local landowners.

Area officials were somewhat less enthusiastic toward mining than the general population in Golden Valley County. One-half of them favored development, either directly or with qualifications, such as the necessity for successful reclamation. Rapid population growth was the dominant concern of these persons. Changed pace of area life, law enforcement and crime problems, and distribution and acquisition of public revenues were mentioned as potential problems.

In Wibaux County, a smaller proportion of the residents favored development. One-third of them were either neutral or unsure about their position on local mining proposals. Local economic growth, increased tax revenues, and the Nation's energy needs were given as the reasons for support. Skepticism on reclamation and concern with local social disruptions, particularly crime and housing, were the most frequently cited reasons for either opposing mining or remaining neutral or unsure.

Wibaux County officials, however, were almost completely supportive of coal mining. While there was concern expressed about dealing with rapid population growth, the national and local (employment and tax revenues) benefits of development were seen as overriding factors.

In both Wibaux and Golden Valley counties, it appears that most people believe that the social atmosphere is the best thing about living in the area. Friendliness, sense of place, informality, lack of crowding and day-to-day disruptions of routine, and sense of sharing, were mentioned as area and community characteristics of most appeal.

Factors that were given as least favorable aspects of life in the area included the long, cold winters, availability of medical facilities, crime, and lack of outdoor recreational opportunities.

CLIMATE AND AIR QUALITY

The climate of western North Dakota is typically continental, characterized by variable temperature and precipitation. The predominant pressure systems, out of the Gulf of Mexico and the Arctic, account for the rapid alterations of meteorological conditions common to the area. Cold polar air masses dominate the winter months, while moist Gulf air masses prevail in the spring and summer, distributing the major precipitation across the area.

Meteorological data available from surrounding stations are shown in Tables 7 and 8. The South Wibaux-Beach tract is located south of the meteorological station at Wibaux and within the National Weather Service (NWS) Southwest Region. The meteorological station at Wibaux will be used to establish benchmark climatology for the tract.

The annual mean temperature for the area is 41.5°F with a highest monthly mean temperature of 68.9°F (in July), and a lowest monthly mean temperature of 11.6°F (in January). The average growing season is approximately 120 days; the last spring freeze generally occurs during the third week of May, while the first fall freeze generally occurs during the third week of September (Ramirez, J.M. and T. Method 1976).

TABLE 7*
METEOROLOGICAL DATA FOR SELECTED SITES

Parameter	Wibaux	Beach	Sentinel Butte	Medora	Dickinson (FAA)	NWS Southwest Region
Temperature, °F						
$\bar{X}$ annual, °F	41.5	43	42	46.1	41.5	42.0
$\bar{X}$ monthly low (Jan)	11.6	14	13	14.0	11.5	12.8
$\bar{X}$ monthly high (July)	68.9	72	71	74.3	69.2	69.6
Average growing season (temp. 32° F), days	121	121	118	121	133	120
Precipitation, in.						
Annual average	14.9	13.5	14.55	13.86	15.88	16.2
Annual range	0.24-3.38	0.3-3.3	0.24-3.75	0.37-3.82	0.41-3.56	0.34-3.97
Annual snowfall	23.5	30	29	33	31.8	12-36
Annual stability, (by class)						
% occurrence						
Class A, B, C					8.9	
Class D					69.9	
Class E, F					21.2	
Wind direction, (%)					W-NW(34)	
Wind speed, mph (% of time)					0-3.5 (4)	
					3.6-6.9 (13.4)	
					7-11.5 (30.5)	
					11.6-18.4 (39.1)	
					18.5-24 (11.3)	
					>24 (1.6)	
Average wind speed, mph					13.7	

*SOURCES:

Jensen, R. E. 1972.
North Dakota Crop & Livestock Reporting Service 1980.
Ramirez, J. M. and T. Method 1976.
Ramirez, J. M. 1972.
Ramirez, J. M. 1973.
U.S. Department of Commerce 1948-1964; 1973; 1974; 1977; 1979a; 1979b.

TABLE 8
REPRESENTATIVE REGIONAL METEOROLOGICAL DATA

	Regional Values
Humidity (Annual Average), %	40-50
Lake Evaporation (Annual Avg.), in.	50-55
Extreme Weather	
Thunderstorms, days/year	30
Tornadoes, sightings/year	rare
Hail, days/year	2-4
Maximum recorded wind speed, mph*	72
Inversion Frequency (base 1500 ft.), %	
Annual	35
Seasonal Range	30-50
Mixing Height, ft.	
Mean Annual Morning	984-1312
Mean Annual Afternoon	4921-5249
Mean Seasonal Afternoon Range	1968-7874

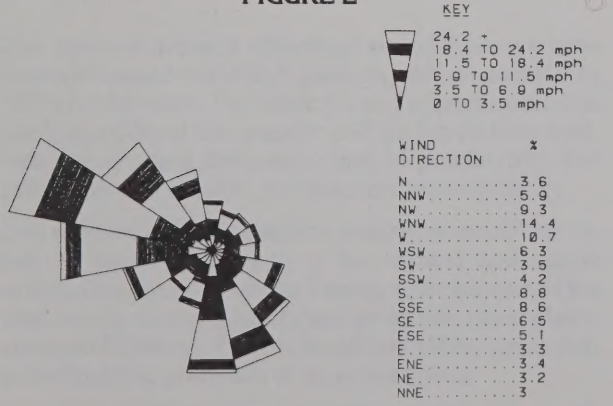
*Recorded at Bismarck, North Dakota

Sources:
Brum, L.J., J.W. Enz and J.M. Ramirez 1978.
Jensen, R.E. 1974.
Ramirez, J.M. and T. Method 1976.
U.S. Department of Commerce 1974.

Precipitation in the area occurs predominately in the late spring and early summer (May to July). Annual precipitation averages 14.19 inches at Wibaux, and 16.20 inches through the NWS Southwest Region. The average annual snowfall at the Wibaux station is 25.4 inches.

Wind data used for this analysis were obtained from the Dickinson climatological station, the nearest station to the tract with data suitable for input into the dispersion model. The wind rose in Figure 2 represents a summary of this data. Winds prevail from the W to NW at Dickinson (34 percent frequency of occurrence). Wind speeds average 13.7 mph and exceed 11.5 mph 52 percent of the time.

FIGURE 2



WIND ROSE FOR DICKINSON NORTH DAKOTA

Although the terrain offers only limited obstruction to the dispersion of pollutants, the area experiences frequent temperature inversions, which reduce mixing heights and tend to concentrate pollutants (Brun L. J., J. W. Enz and J. M. Ramirez 1978).

Table 9 presents some of the available air monitoring data from ambient air monitoring stations in the general vicinity. Recorded annual geometric mean concentrations for total suspended particulates (TSP) from area rural locations have ranged from 11 ug/m^3 (at Medora) to 29 ug/m^3 (at Bowman). The sparse population in this region and the lack of local urban ambient air monitoring stations, precludes the consideration of urban impacted samples. For the purpose of the following computer analyses, the background rural TSP levels will be set at 22 ug/m^3 for the annual level and 80 ug/m^3 for the 24-hour level.

Three Class I areas, the North and South Units of Theodore Roosevelt National Park and the Lostwoods National Wilderness Area, fall within the potential impact range of the proposed tract and associated developments. Based on 1979 air quality computer modeling estimates by the North Dakota State Department of Health, the allotted 24-hour SO_2 increment for the South Unit of the Park is consumed, or nearly consumed. Visibility was observed to range from 73 to 96 miles at the Theodore Roosevelt National Park during 1979 (John Muir Institute; Mimeo, April 1980).

TABLE 9
SOUTHWESTERN NORTH DAKOTA AIR MONITORING DATA

Monitoring Site	Year	Parameter	No. Observations	Max. Observation	2nd Max. Observation	Annual Geom. Mean	Annual Arith. Mean
Medora	74	TSP	19	88	45	11	19
	75	TSP	49	72	50	13	18
	76	TSP	43	120	46	16	22
	77	TSP	49	118	115	16	23
	78	TSP	51	95	84	13	18
	79	TSP	51	48	40	14	17
	80	TSP	55	1313	442	21	54
		SO_2	7597	60	50	5	5
Dickinson	76	TSP	59	76	64	26	32
	77	TSP	55	421	192	26	41
	78	TSP	54	162	97	21	29
	79	TSP	30	96	96	21	28
TRNP	79	TSP	44	53	49	14	20
	80	TSP	53	83	47	20	32
		SO_2	7432	133	110	<5	<5
Bowman	74	TSP	21	94	51	19	26
	75	TSP	46	214	112	19	31
	76	TSP	54	127	125	29	40
	77	TSP	59	232	140	21	31
	78	TSP	49	112	65	18	24
	79	TSP	51	79	79	19	26
	80	TSP	58	293	208	24	37
Dunn Center	79	TSP	4	37	17	16	19
		SO_2	1986	78	26	13	13
	80	TSP	33	58	52	22	25
		SO_2	7332	52	39	<5	<5
New England	76	TSP	20	26	18	10	12
	77	TSP	59	317	157	14	26
	78	TSP	33	37	33	13	15
Regional**	76	TSP	176	127	125	19	27
	77	TSP	222	421	317	19	30
	78	TSP	187	162	112	16	22
	79	TSP	180	96	96	17	22
	80	TSP	199	1313	442	22	32
		SO_2	22,361	133	110	<5	<5

SOURCE: North Dakota State Department of Health

**Composed from the observed regional means

CHAPTER III
ENVIRONMENTAL CONSEQUENCES

TOPOGRAPHY

The natural contour would be modified during surface mining. Although most would be returned to its approximate original contour, difference in detail would remain, including drainage patterns and final sloped highwalls. Various facilities related to mining would modify the surface permanently. These changes would alter natural erosional patterns, which in turn could modify rates of gully cutting and sediment yield, depending on the effectiveness of reclamation.

In general, the reshaped ground would not be steep enough to cause slope failures and related hazards. Until natural vegetation can be reestablished, accelerated sediment yield and unsightly scars on the land would be potential problems.

GEOLOGY AND MINERALS

The major impact of the leasing alternative would be the removal of 595.9 million tons of coal. A total of 14.5 million tons of federal coal would be bypassed by mining and lost. Mineral resource conflicts may occur between development of oil and gas and mining of coal, since there is at least a moderate potential for finding oil and gas on the tract.

PALEONTOLOGY

No significant impacts would be expected.

SOILS AND RECLAMATION POTENTIAL

The types of impacts affecting the soil resource have been discussed in the BLM planning documents (URA, MFP) for this area. The basic mining impacts would be the disruption of the present soil bodies as they exist, with the ensuing temporary loss of productivity and problems with erosion, compaction, and instability.

Soil erosion and compaction problems would not be new to the area because of the dryland agricultural activity that presently exists. Twenty-eight percent of the total tract is annually left bare of protective cover due to summer-fallowing. These conditions will continue with or without the presence of an active mine.

Some instability problems would probably appear with the onset of reclamation. Area-wide settling, localized subsidence or collapse, and underground erosion, or piping, could occur (Groenwald, 1980). The extent of these problems would depend on the planning and implementation of a concerted reclamation effort (Power, 1979).

The soils will be lost for the production of grass, forage, grain, etc. over the short-term use (about 10 to 15 years for each given acreage) of the tract. In Montana it would take longer to get back to crop production because the State requires a native species mix or acceptable introduced species in reseeding and testing. Montana lands can be put back into grain production only after they are turned back to the landowner.

The loss would be occurring only on the active portion of the mine at any given time (approximately 359 acres disturbed each year). Once in full operation, total acreage out of production in any given year is estimated at 3,590 to 5,385 acres. Soils will be continuously replaced on mined out areas and brought back into production during the life of the mine (42 years).

Over the long run, the original level of agricultural productivity of the soil resource should return to the tract. The acreage rated "poor" for soil suitability might even have agricultural productivity increased by averaging suitable plant growth material over each landowner's area. Preliminary indications from completed and ongoing research, by such agencies as the Science and Education Administration—Agricultural Research (SEA-AR) of Mandan, North Dakota and North Dakota State University—Agricultural Experiment Station (NDSU-AES) of Fargo, are that productivity of mined land can be restored.

HYDROLOGY

During mining, all of the surface runoff from the disturbed area must be impounded (and not released) until it meets specified quality standards. An exception to this would be when storm runoff exceeded the design capacity of the reservoir. Water that collects in open mine pits is also often pumped into these surface water reservoirs. While these runoff catchment basins are in place, total water yields would be decreased due to increased evaporation and infiltration at the reservoirs. Table 10 shows the maximum expected loss of yield for the watersheds draining this tract, by assuming no surface water is released. The impact on local streams could be significant.

TABLE 10
MAXIMUM LOSS OF WATER YEILD FROM THE SOUTH WIBAUX-BEACH TRACT

Watershed	Area to be Disturbed (acres)	% of Watershed to be Disturbed	Maximum Water Yield Reduction (acre feet/yr)	% Reduction in Flow
Duck Creek	10,114	35.4	632	35.4
Unnamed Creek 1	2,431	49.0	152	49.0
Unnamed Creek 2	771	37.1	48	37.1
Unnamed Creek 3	530	35.7	33	35.7
Unnamed Creek 4	3,984	27.8	249	27.8
Closed Basin	1,210	100.0		100.0
Little Beaver Creek	93	0.1	4	0.1
Beaver Creek at Wibaux	19,040	8.5	1,114	7.0
Beaver Creek at Trotters	19,133	6.2	1,118	5.1

Water which is released from the impoundments would generally have less suspended solids, higher dissolved solids and higher sodium adsorption ratios. At this time it is impossible to predict exactly how much difference there would be in these water quality parameters. There are several basins within this tract that support ephemeral or temporary wetlands. During the mining phase these natural wetlands would be destroyed. The local groundwater system is dependent upon the wetlands for recharge. In order to maintain postmining recharge similar to the premining system, these wetlands must be re-created with similar water balance characteristics.

The Harmon lignite, which forms the upper aquifer over the tract, would be mined. The sandstone forming the Lower Tongue River aquifer would remain in place approximately 10 to 200 feet below the mine pit floor. As mining progresses from the west toward the east, the aquifer forming lignite would be removed and the major recharge area for the local Harmon Lignite aquifer would be gradually disrupted. While the mine pits are open, water levels in the Harmon Lignite would be drawn down in the area surrounding an open pit. The distance that this drawdown would occur from an open pit will vary across the tract. The amount of drawdown is dependent upon the local lignite fracture characteristics and upon how far below the water level the bottom of the pit is located. This impact would affect the area north and east of the tract. Water wells in this area are usually finished in the Harmon lignite or Lower Tongue River sand. Wells finished in the Harmon Lignite in the vicinity of an open pit would experience a water level drawdown. The Beach municipal wells used for summer lawn sprinkling would lose a significant amount of water level as mining occurs in the northeast part of the tract. The amount of drawdown would depend upon how close to the pit the well is located and the local aquifer characteristics.

The flow pattern of groundwater through the area would also be disrupted. The open pit would act as a groundwater sink. During mining, this effect limits all groundwater quantity and quality impacts to the area included within this cone of depression around the open pit. Water levels over the entire tract and adjacent areas would not change everywhere at once. It would be a progression as mining moves from west to east.

Once the overburden is replaced in the pit, the drawdown stress would begin to subside and approach a postmining equilibrium. The flow patterns of groundwater would be different than under premining conditions. Generally water would not be as available from the replaced overburden under postmining conditions. Significant water quantity loss to wells north and east of the mined area can be expected to continue indefinitely, because mining would destroy the recharge area for this part of the Harmon Lignite aquifer.

The physical disturbance caused by a mining action would result in changes in the chemical quality of the local groundwater. Increases in sodium, sulfates, and total dissolved solids concentrations have been reported by Groenwald (1979 and 1980) at other mines in North Dakota with similar overburden. These changes in water quality were variable but dependent upon overburden characteristics and reclamation practices. The quality of water in the replaced overburden and the Harmon Lignite down gradient would be similarly degraded. As water moves through the lignite away from the mined area, it would be diluted by relatively fresh recharge water from unmined areas. Studies to date have not found altered water quality further than about two miles away from mined areas. It is not known exactly what the area impacted would be in the long term.

Any wells finished in the mined area below the Harmon lignite would be physically destroyed, but their water source would not be significantly altered. Wells finished in or above the Harmon lignite within the tract would have their water source degraded if not destroyed. Wells finished in the Harmon lignite in the area surrounding the tract could have their water source degraded. The uses impacted are domestic and stock water supplies. The Beach shallow wells finished in lignite or sand may have the quality of their water source degraded.

Table 11 shows the approximate depths to replacement groundwater sources. Associated with these deeper replacement wells would be higher operating and maintenance costs to the local water users. Also any additional wells needed in the future, after the mining company has fulfilled its replacement obligations and left the area, would cost more to drill. The cost of these additional wells would not be paid by the mining company. The quality of water found in deeper aquifers is not as suitable for lawn sprinkling as Beach's shallow wells.

TABLE 11
APPROXIMATE DEPTHS TO REPLACEMENT GROUNDWATER

	Aquifer Depth Below the Harmon Lignite (feet)
Lower Tongue River	10-200
Ludlow	300-600
Fox Hills	1000

VEGETATION AND AGRICULTURAL PRODUCTION

The proposed action would progressively remove an average of 360 acres of the total tract per year from its current uses. The major use of these lands is agricultural production. Land will be first taken out of agricultural production (except for the plant site and ancillary facilities) in the first year of mining. The time period of removal from agricultural production would be the time spent in mining and land reclamation. The entire tract would be progressively mined over a 42 year period.

Mining of any one point would be the land use for one to five years, depending on the type of mining. Land reconstruction, to premining levels of agricultural production, would require a total of approximately 10 to 15 years. In North Dakota, the land would be placed into the premining type of agriculture or whatever the landowner and Public Service Commission agree upon. In Montana, the emphasis will be more on the restoration of native-type range on reclaimed land. Vegetation would be established during the first appropriate season after grading to topography and replacing of topsoil.

The company would be under bond for at least ten years, or as long as necessary to prove, at a 90 percent confidence level, that agricultural productive capacity had been restored (North Dakota Public Service Commission, Reclamation Department 1980; and Montana Department of Public Service Regulation 1980). Reclamation research by such agencies as the Science Education Administration-Agricultural Research Service (SEA-AR), the North Dakota State University-Agricultural Experiment Station (NDSU-AES), and the Reclamation Research Project at Montana State University indicates some degree of optimism for the restoration of land to agricultural production, although there is no certainty as to how long it would be before all mined land would be judged as fully restored as the law requires.

The leasing and development alternative would have a significant short-term impact on individual agricultural operations in the tract. By the end of the mine life, 15,094 acres of the tract would be disturbed, in addition to 160 surface acres used for mine facilities.

An average of 241 acres of cropland, excluding summer fallow, would be removed from production each year. This would be an average annual loss of 7,085 bushels of wheat. This 241 acres of cropland would be out of production ten to fifteen years, with a maximum of 2,438 to 3,657 acres out of production in any one peak mining year, resulting in a maximum loss of 71,677 to 107,516 bushels of wheat annually.

An average of 18 acres of rangeland would also be removed from production each year, resulting in an average loss of 9 AUMs. This 18 acres of rangeland would be out of production ten to fifteen years with a maximum of 171 to 257 acres out of production in any one peak mining year, resulting in a maximum annual loss of 86 to 129 AUMs.

Regionally, these losses would not pose significant reductions in area agricultural production. Time constraints necessitated collecting agricultural data on the preliminary tract boundaries instead of on the later final tract boundaries. The data may not completely represent the tract in its final form.

In the reestablished native-type range it is likely that some introduced species will be used. The laws require that introduced species be of the same seasonal variety and of equal or superior utility as the native species. Some of the more sensitive plants (for cropland, woodland, or rangeland use) may have difficulty in becoming established on some of the less suitable soils.

AGRICULTURAL ECONOMICS

This section will be forthcoming under separate cover.

LAND USE

Agricultural use would be displaced by active mining and reclamation in the short term; from 10 to 15 years would be required before use could resume on most of the tract.

Population increases due to mining activity would affect nearby communities, primarily Wibaux and Beach, through demand for residential and commercial expansion. This expansion should be considered long-term and irreversible.

Roadways and utilities would either be relocated or bypassed, creating some minor inconvenience, particularly if they are relocated.

Oil and gas exploration and development would be hindered during active mining and would be delayed in some areas for the life of the mines. This delay would preclude utilization of this resource and the delay, though temporary, could preclude use of this other resource by limiting the ability to logically develop a field.

RECREATION

Habitat destruction and the resulting loss of wildlife species would damage recreational hunting.

Social and economic studies have documented demographic changes resulting from mining that will stress Wibaux, Montana; Beach, North Dakota; and other communities in the vicinity of the tract. This stress will be felt on the available recreation facilities in the communities. Outside of the communities, increased pressure will be seen on private and public land because of recreational opportunities lost to mining.

AESTHETICS

Views to the tract from Wibaux and Beach are few, and the observable changes in the visual surface would be relatively small at any given time. Impact to the area as scenery would be almost negligible and restoration through progressive mining and reclamation would imply a relatively minor short-term impact.

In some views of the tract from Highway 94, mining activity would be highly visible. This impact would be short-term and intervening land forms would mitigate this effect. Spoil piles would be the most noticeable feature of mining. Depending upon the placement of spoil piles and stockpiles, mining could be either a moderate or a severe aesthetic impact; but in either case, when mining and reclamation are complete, no aesthetic impact would remain.

WILDLIFE

Most of the tract is farmland, the balance being native prairie, wetlands, or other unfarmed land. These isolated unfarmed wildlife habitats have exceptional value. Mining would eliminate these unique remnants for some years during which time there would be little, if any, substitute or replacement habitat. Aquatic habitats such as the wetlands along the Montana-North Dakota border provide the only significant wildlife water during most years. These and various other seasonal wetlands would be lost.

Vegetation associated with stream courses, wetlands, and isolated woodlands provides essential reproduction and overwintering habitats for numerous wildlife species. Farm stubble and fallow provide limited warm season habitat and no winter cover. Conversion of native grasslands, stream courses, woodlands and wetlands to postmining farmland would further degrade the limited wildlife habitats in the area.

Mobile wildlife such as birds and large mammals may shift about the habitat losses to some degree; but non-mobile species, such as reptiles and amphibians, would be destroyed.

Noise, presence of humans, heavy equipment and dust cumulatively may cause wildlife to vacate unmined habitats and may preclude adoption by wildlife of those rehabilitated areas until the disturbances are eliminated.

Concurrent replacement of lost wildlife habitat within 12 to 18 months may reduce the negative wildlife impacts. Development of permanent water sources other than wells is necessary to provide the critical seasonal water for aquatic and terrestrial wildlife. Wetlands and reservoirs are most valuable. Large units of woody vegetation and native grassland around the wetlands are most productive. At present it cannot be proved that natural, biologically viable wetlands can be reclaimed from mine spoil in this country. It would be most productive and conservative to eliminate mining from the largest wetlands, greater than 3 to 5 acres.

If mining does not avoid the natural wetlands, and no substitute water and associated habitats are generated during mining, then there would be no mitigation and these wildlife resources would be subject to negative impacts. Destruction of natural viable wetlands by strip mining under the present state of biological and hydrological knowledge would be an irretrievable commitment of wildlife resources.

Poaching and road kills have increased dramatically in areas of Montana, Wyoming, and Colorado where energy development has occurred. The problem is compounded in areas where shift changes of workers coincide with feeding periods, especially big game.

Actions to mitigate these impacts, available to entities other than BLM, would be to provide mass transportation of workers and adjust the times of shift changes which would greatly reduce poaching. This has been used successfully in other mining areas. Providing funds for the North Dakota Game and Fish Department

for increased law enforcement or adoption of a poaching clause in union contracts would also help.

Roads located through valuable wildlife habitat would result in road kills of wildlife as well as further destruction of habitat. As a result of disturbance and the reductions in wildlife numbers through direct mortality and habitat destruction, recreational opportunities such as wildlife viewing and hunting would be reduced in the area around the mine.

An interagency team of wildlife biologists from the North Dakota Game and Fish Department, U.S. Fish and Wildlife Service, and Bureau of Land Management have identified and recommended areas for the application of unsuitability criteria (Map 3). Formal recommendations have been received by BLM from the other agencies. Joint agreement among the agencies and the final decisions on unsuitability, exemptions such as producing leases, and exceptions will be completed in August 1981.

CULTURAL RESOURCES

All cultural resources within the tract boundaries are subject to direct and indirect impacts. Direct impacts are those that result from ground disturbance activities and can result in damage and destruction to sites, artifacts, their environmental context, and the data they contain.

Sites not directly impacted by earth disturbance may be impacted as a result of the earth disturbance. These secondary impacts can include vandalism increased by improved access, loss as a result of erosion, or degradation resulting from disruption in natural setting.

If the tract is leased, stipulations covering cultural resources will have to be developed. These stipulations will have to treat both recorded and unrecorded sites. They will also have to require management plans for cultural resources that detail mitigation plans for each site to be impacted. As in any cultural resources mitigation, preservation alternatives are preferred. If these options are not viable, then scientific data recovery programs will have to be developed.

ECONOMIC AND SOCIAL CONDITIONS

Construction and operation of the Wibaux-Beach mine would result in significant impacts upon services in some communities within the area, as a result of population growth associated with employment opportunities. Figure 3 shows forecasted community employment and population levels through 2000 both with and without development of the Wibaux-Beach tract. As this figure shows, Wibaux, Lambert, and Savage, Montana and Beach, Golva, and Sentinel Butte, North Dakota would experience a significant increase in both population and employment as the result of the development of the tract.

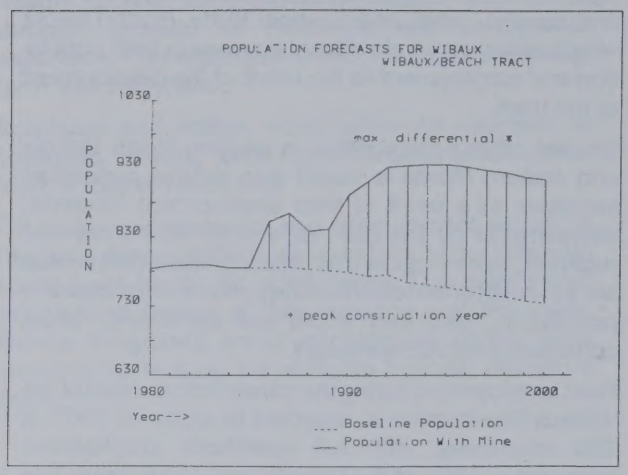
Several other communities in western North Dakota and eastern Montana would also receive population increases as a result of tract development. However, assessments by the BLM as well as city-county and regional planners show that these population increases are so small (often less than one percent of the baseline population), that they would not significantly affect community service adequacy.

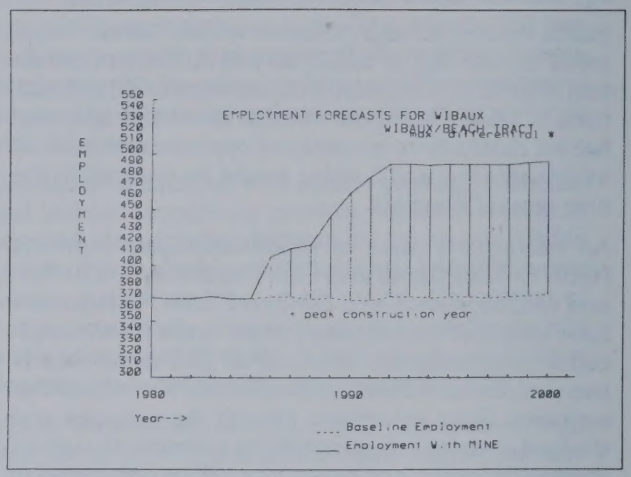
Peak employment during the construction phase of the Wibaux-Beach mine is expected to occur in 1987 at 260 employees, with full operations employment expected in 1993 at 440 employees. Using these two years as primary impact dates, it is estimated that the communities of Wibaux, Lambert, and Savage, Montana and Beach, North Dakota would experience an inadequate level of community services as a direct result of the 1987 peak construction employment/population levels associated with construction of the mine (Figure 4). Golva and Sentinel Butte, North Dakota would experience an inadequate level of some community services by 1987 without tract development. Tract-related population influx would further exacerbate an inadequate service situation.

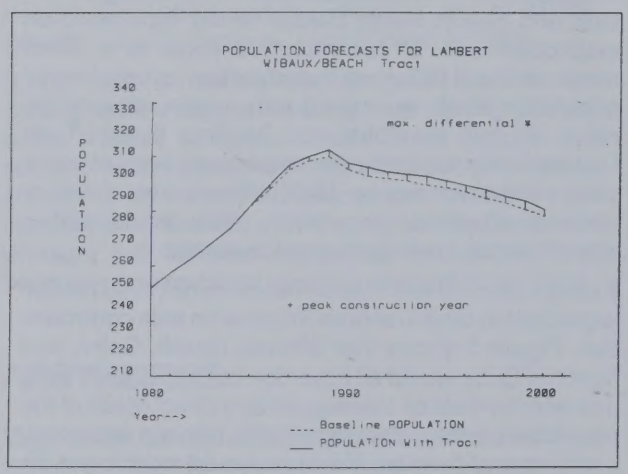
Full operation of the Wibaux-Beach mine (1993) is also expected to result in serious impacts on area communities. Figure 5 shows that Wibaux, Beach, Golva, and Sentinel Butte would all have one or more public services which would be inadequate as a direct result of the population influx associated with mining operation. Lambert and Savage, Montana would experience an inadequate level of some community services in 1993 without tract development. Tract-related population growth would result in additional strains on these services.

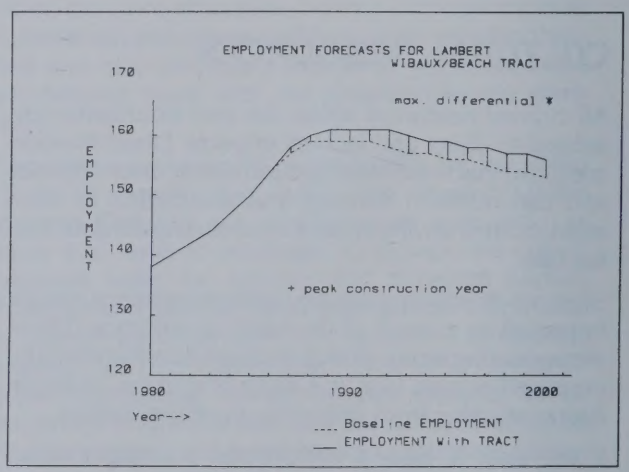
Several of the services appearing in the community service groupings are of greater importance than others in maintaining public health and safety. Basic services such as sewage collection and treatment, water supply and water storage/distribution, health care, and police/fire protection are of more immediate concern to community well-being than are non-basic services such as recreation facilities and libraries. Consequently, communities which experience impacts to these basic services would undergo somewhat greater difficulties than would a community which experiences impacts on its non-basic services. Additionally, inadequacy of basic services (water and sewage systems especially) can be difficult for a community to deal with because of the relatively large capital expenditures required for upgrading these plants and services.

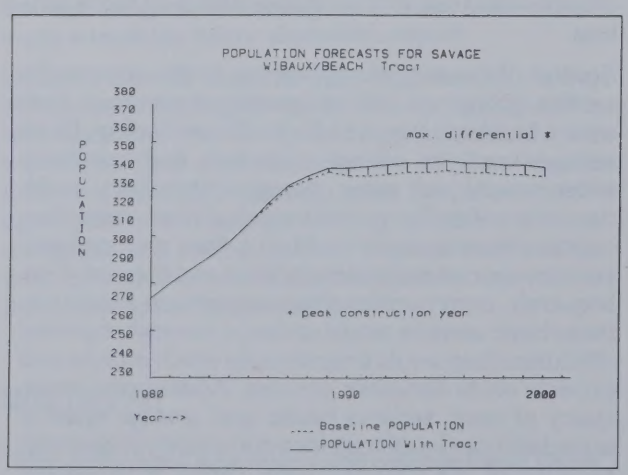
FIGURE 3


POPULATION FORECASTS FOR WIBAUX
WIBAUX/BEACH TRACT
POPULATION
1030
930
830
730
630
max. differential *
+ peak construction year
1980
1990
2000
Year-->
---- Baseline Population
___ Population With Mine


EMPLOYMENT FORECASTS FOR WIBAUX
WIBAUX/BEACH TRACT
EMPLOYMENT
max. differential *
+ peak construction year
1980
1990
2000
Year-->
---- Baseline Employment
___ Employment With MINE


POPULATION FORECASTS FOR LAMBERT
WIBAUX/BEACH Tract
POPULATION
340
330
320
310
300
290
280
270
260
250
240
230
220
210
max. differential *
+ peak construction year
1980
1990
2000
Year-->
---- Baseline POPULATION
___ POPULATION With Tract


EMPLOYMENT FORECASTS FOR LAMBERT
WIBAUX/BEACH TRACT
EMPLOYMENT
170
160
150
140
130
120
max. differential *
+ peak construction year
1980
1990
2000
Year-->
---- Baseline EMPLOYMENT
___ EMPLOYMENT With TRACT


POPULATION FORECASTS FOR SAVAGE
WIBAUX/BEACH Tract
POPULATION
380
370
360
350
340
330
320
310
300
290
280
270
260
250
240
230
max. differential *
+ peak construction year
1980
1990
2000
Year-->
---- Baseline POPULATION
___ POPULATION With Tract

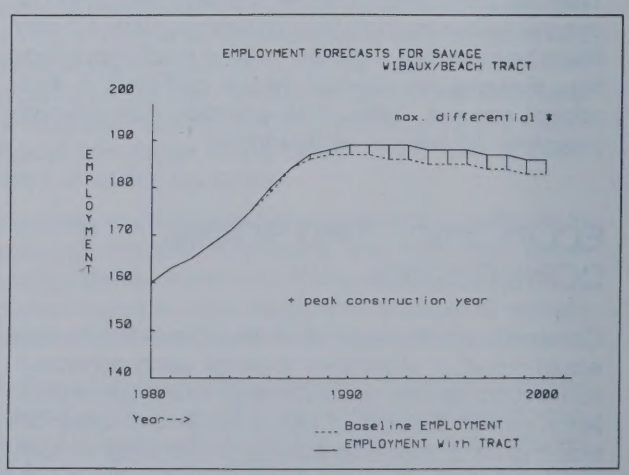
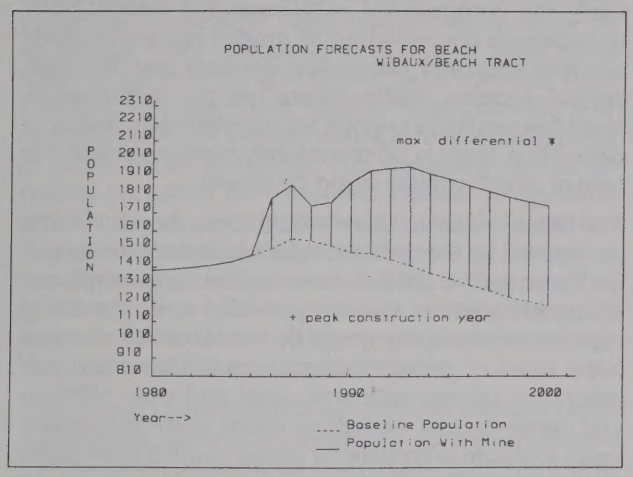
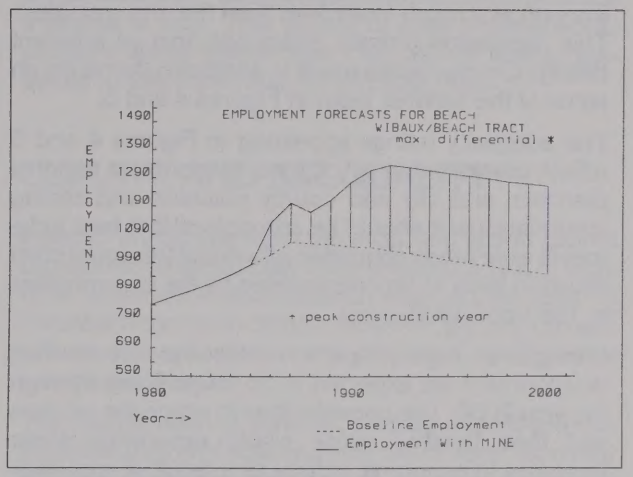
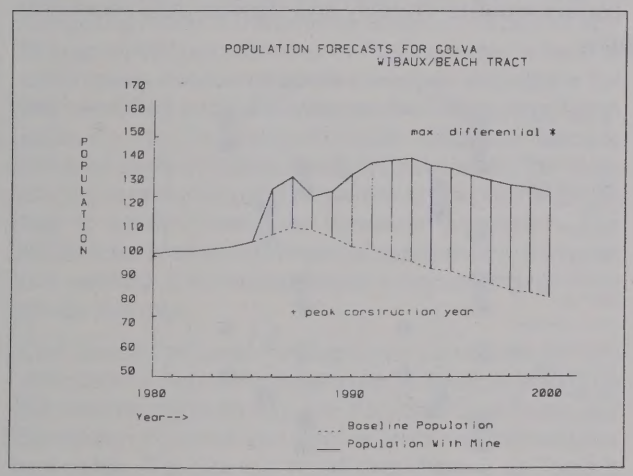
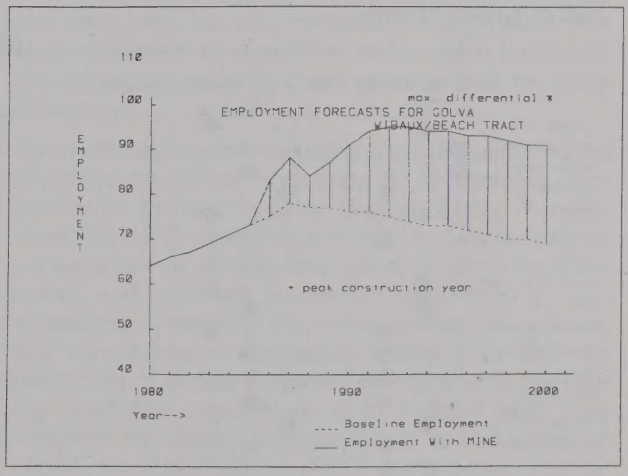

EMPLOYMENT FORECASTS FOR SAVAGE
WIBAUX/BEACH TRACT
EMPLOYMENT
200
190
180
170
160
150
140
max. differential *
+ peak construction year
1980
1990
2000
Year-->
---- Baseline EMPLOYMENT
___ EMPLOYMENT With TRACT

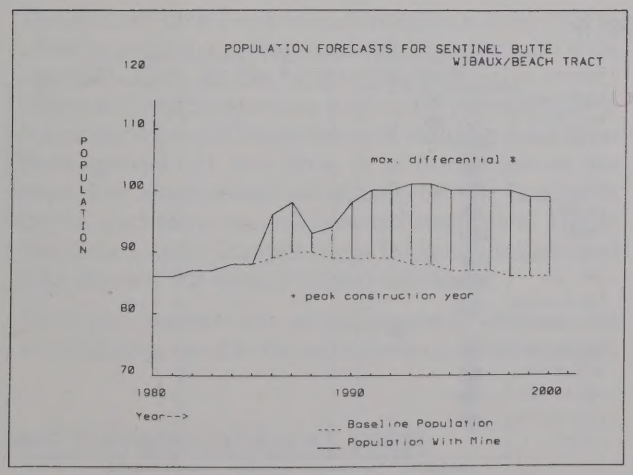
FIGURE 3 (continued)

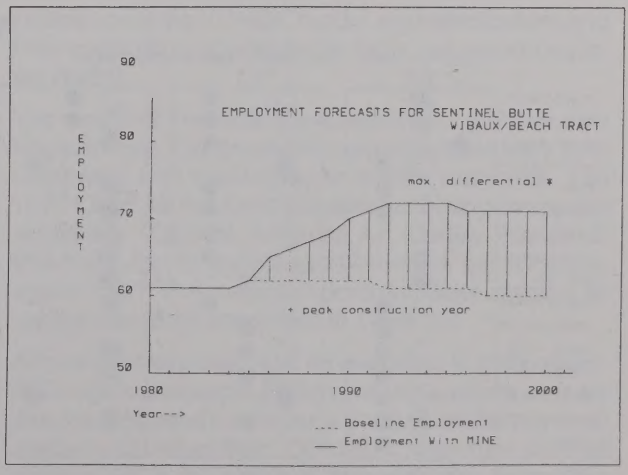












SOURCE: Mountain West Research, Inc., 1981.

The rural areas of Wibaux and Golden Valley counties would also receive tract-related population influx (though at a much lower level than the communities). This population growth, along with that of adjacent Billings County, would result in additional demands on some of the services listed in Figures 4 and 5.

The adequacy ratings appearing in Figures 4 and 5 reflect assessments by city-county planners, regional planners, and city and county planning and zoning commissions. It should be recognized that best judgments were made concerning the fiscal (revenue/cost) situation likely to be encountered by the communities in 1987 and 1993.

Changes in regional personal income due to tract development are expected to be insignificant through the year 2000. The communities in which the workers and their families reside would experience some increases in economic activity as a result of employee payroll expenditure and through company expenditures for goods and services during the construction and operation phases.

The social effects of developing these tracts would be centered in Wibaux and Golden Valley counties, particularly the communities of Wibaux and Beach. Both counties are characterized by limited economic diversity and attendant population declines over the past several decades. Neither oil and gas nor coal development has resulted in significant population increases to date. Thus, there is no community experience with the type of developments being proposed.

For these reasons, there would likely be short-term disruptions in the political, religious, educational, and family structures of these communities. However, these changes would not likely be pervasive among existing residents and stability would be reestablished after the initial burst of growth. Adequate notification and collaboration among residents, local and state officials, and company representatives could, given the several years available to prepare for growth, further reduce the magnitude of the effects.

Coal development presents an opportunity for these communities to diversify and stabilize their economic

FIGURE 4

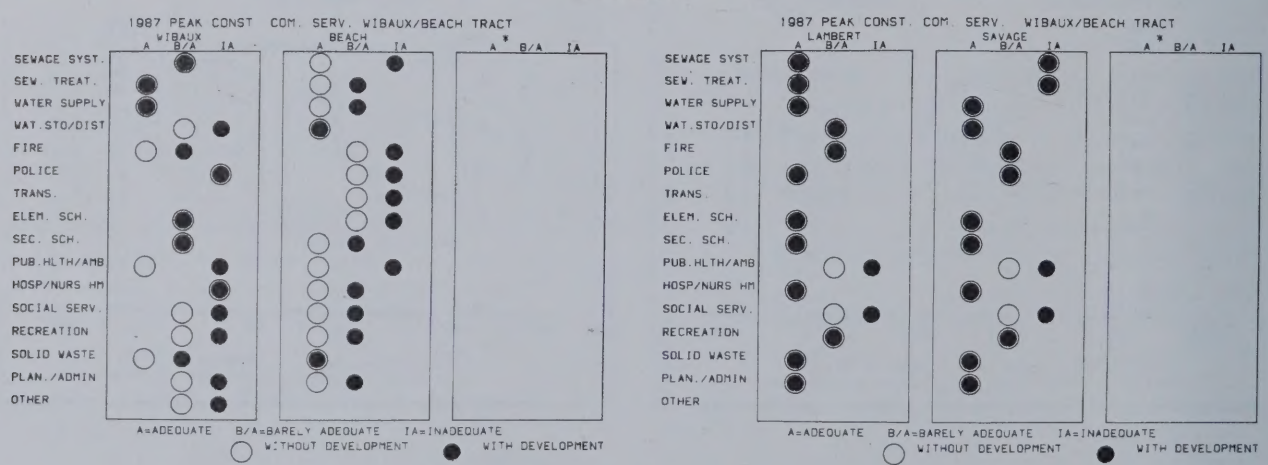
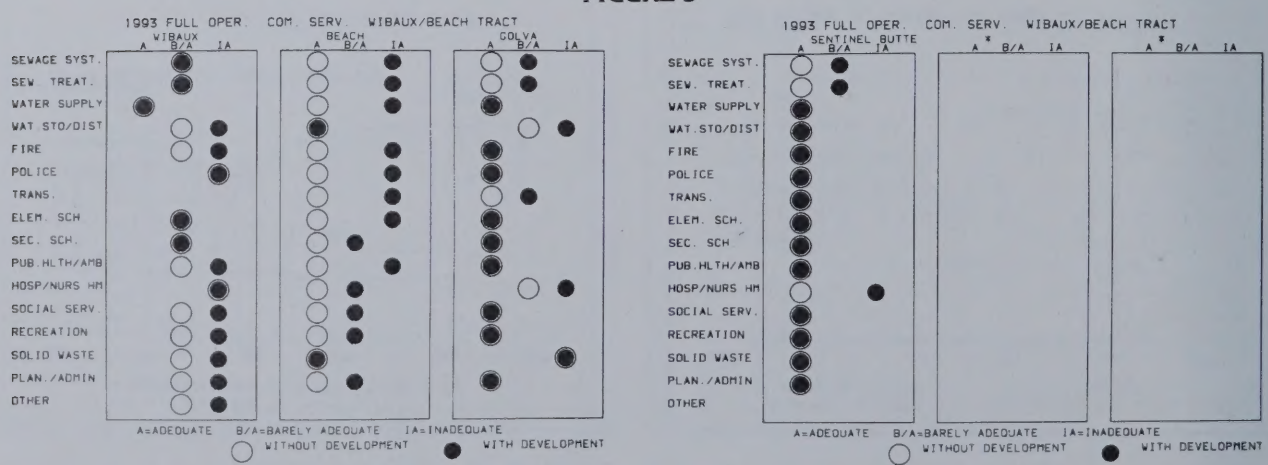


FIGURE 5



SOURCE: Respective city/county or regional planners.

circumstances over the long run. Given the present size and composition of existing populations, the transition period of moderately rapid change would likely be somewhat more difficult for residents in these areas than for persons living in larger, more complex communities. In Wibaux and Golden Valley counties, economic growth and stability would, at least initially, result in some social instability. This instability should be neither persistent nor long-lived, however. Population growth, at least over the short run, would likely lead to a decline in the residents' endorsement of the social atmospheres of Wibaux and Golden Valley counties. Informality, lack of stress, and lack of crowding would be less evident. These changes would not be particularly profound but would be noticeable.

Those area characteristics described in negative terms by residents, particularly shortages of medical care and crime, would probably be more evident, further reducing satisfaction with the area.

There appear to be three factors that are critical in mitigating many of the adverse economic impacts due to coal related population growth. One factor is that the community needs adequate lead time to prepare for the increased population before the major population influx occurs. The second crucial mitigation factor is the availability of planning expertise to assist the community in designing and implementing a planning strategy to accommodate the increased population. The third factor is adequate financial assistance to carry out the needed community service improvements in a timely manner.

The Bureau of Land Management can make recommendations regarding leasing dates to allow lead time for community planning. The Regional Coal Team and Secretary of Interior can also recommend certain leasing dates. The Bureau recommendations on leasing dates will be made during the environmental impact statement phase after tract ranking has occurred.

The affected counties and communities may be able to obtain planning and financial assistance through state agencies such as the North Dakota Energy Impact Office and federal agencies such as the Farmers Home Administration and Department of Housing and Urban Development. At this time, it is not known if the impacted communities will actually be able to acquire the needed planning and financial assistance. This is dependent upon Congressional budgeting action and total demand for energy impact assistance.

Technical reports are available which discuss the methodology used in the economic or social analysis.

NET ENERGY ANALYSIS

A net energy analysis was calculated using the guidance contained in BLM Washington Office Information Memo 80-640, July 17, 1980. Approximately 37.7 British thermal units (Btus) would be expended to produce a pound of coal. That pound of coal, in turn, would produce about 5,966 Btus. The ratio of energy produced to that expended is 158 Btus/1 Btu.

CLIMATE AND AIR QUALITY

Impacts on climate from the proposed action cannot be addressed specifically. This is due to a lack of technical information and research work on the topic of potential impacts on climate. However, general climatic influences applicable to the proposed development can be discussed.

The modification of surface contours and albedo due to redistribution of soils and removal of vegetation may produce slight localized changes in wind speed and direction, temperature, and humidity. Impacts associated with the increased particulate emissions could also alter local climatic conditions. Reclamation with reestabiishment of vegetation and a stable landscape should largely mitigate these impacts over the long-term.

The methodology for determining the air quality impact of particulate emissions consists of: 1) obtaining mine profiles for the tract from the Bureau of Land Management (BLM); 2) obtaining emission factors for individual surface coal mining operations; 3) using the mine profile and emission factors for calculation of total emissions; 4) entering the emission data into a modified climatological dispersion model (CDMQC) for prediction of ambient concentrations; and 5) comparing predicted concentrations to Federal and State Ambient Air Quality Standards and to Prevention of Significant Deterioration (PSD) increments. The air quality impact was analyzed for the proposed tract's peak production period.

Details about the CDMQC model, emission factors, and their application appear in the technical report (separate cover).

The results of the modeling analysis were plotted on an isopleth map. The predicted concentrations were then compared with applicable air quality standards. The 1970 Clean Air Act Amendments establish primary and secondary National Ambient Air Quality Standards (NAAQS). North Dakota established air quality standards in 1969. The present Federal and State ambient air quality standards are shown in Table 12.

All pollutant sources must be evaluated to determine if PSD regulations apply. Preliminary evaluations indicate that the proposed coal mine's product emissions (coal dust) would be less than 250 tons/yr; therefore, the coal mine is not a PSD source. However, the State PSD regulations specify that if the fugitive dust emissions cause the total potential particulate emissions to be in

TABLE 12
COMPARISON OF AMBIENT STANDARDS
FEDERAL VS. NORTH DAKOTA

	Federal Ambient Air Quality Standards (UPA)			North Dakota Ambient Air Quality Standards	
Pollutant	Wording of Standard	Secondary Standard	Primary Standard	Primary Standard	Wording of Standard
TOTAL SUSPENDED PARTICULATES	Annual geo. mean conc.	60 ug/m^3	75 ug/m^3	60 ug/m^3	Annual geo. mean conc.
	Max. 24-hr. concentration not to be exceeded more than once per year	150 ug/m^3	260 ug/m^3	250 ug/m^3	Max. 24-hr. conc. not to be exceeded more than once per year
SETTLED PARTICULATES (Dustfall)	(At present there is no federal standard.)			15 tons/ sq. mile	Max. 3-month arithmetic mean in residential areas
				30 tons/ sq. mile	Max. 3-month arithmetic mean in heavy industrial areas
COEFFICIENT OF HAZE	(At present there is no federal standard)			0.4 coh. per 1000 linear ft.	Max. annual geo. mean
SULFUR DIOXIDE	Annual arith. avg. conc.		.03 ppm (80 ug/m^3)	60 ug/m^3 (0.02 ppm)	Max. annual arithmetic mean
	Max. 24-hr. concentration not to be exceeded more than once per year		.14 ppm (365 ug/m^3)	260 ug/m^3 (0.10 ppm)	Max. 24-hr. conc.
	Max. 3-hr. concentration not to be exceeded more than once per year	.50 ppm (1300 ug/m^3)		715 ug/m^3 (0.24 ppm)	Max. 1-hr. concentration
REACTIVE SULFUR (Sulfation)	(At present there is no federal standard)			0.24 mg SO_3/100 cm^2/day	Max. annual arithmetic mean
				0.50 mg SO_3/100 cm^2/day	Max. for a 1-month period
SUSPENDED SULFATE	(At present there is no federal standard)			4 ug/m^3	Max. annual arithmetic
				12 ug/m^3	Max. 24-hr. conc. not to be exceeded over 1 percent of the time
SULFURIC ACID MIST, SULFUR TRIOXIDE OR ANY COMBINATION THEREOF	(At present there is no federal standard)			4 ug/m^3	Max. annual arithmetic mean
				12 ug/m^3	Max. 24-hr. conc. not to be exceeded over 1 percent of the time
				30 ug/m^3	Max. 1-hr. concentration not to be exceeded over 1 percent of the time

TABLE 12 (cont.)
COMPARISON OF AMBIENT STANDARDS
FEDERAL VS. NORTH DAKOTA

	Federal Ambient Air Quality Standards (UPA)			North Dakota Ambient Air Quality Standards	
Pollutant	Wording of Standard	Secondary Standard	Primary Standard	Primary Standard	Wording of Standard
HYDROGEN SULFIDE	(At present there is no federal standard)			45 ug/m^3 (0.032 ppm)	Max. ½-hr. conc. not to be exceeded more than twice in any 5 consecutive days.
				75 ug/m^3 (0.054 ppm)	Max. ½-hr. conc. not to be exceeded over twice a year
CARBON MONOXIDE	Max. 3-hr. concentration not to be exceeded more than once per year	9 ppm (10 ug/m^3)	9 ppm (10 ug/m^3)	10 ug/m^3 (9 ppm)	Max. 3-hr. conc. not to be exceeded more than once per year
	Max. 1-hr. concentration not to be exceeded more than once per year	35 ppm (40 ug/m^3)	35 ppm (40 ug/m^3)	40 ug/m^3 (35 ppm)	Max. 1-hr. conc. not to be exceeded more than once per year
OZONE	Max. 1-hr. concentration not to be exceeded more than once per year	0.12 ppm (235 ug/m^3)	0.12 ppm (235 ug/m^3)	235 ug/m^3 (0.12 ppm)	Max. 1-hr. conc. not to be exceeded more than once per year
HYDROCARBONS (Less Meth.)	Max. 3-hr. concentration (6-9 a.m.) not to be exceeded more than once per year	.24 ppm (160 ug/m^3)	.24 ppm (160 ug/m^3)	160 ug/m^3 (0.24 ppm)	Max. 3-hr. conc. (6-9 a.m.) not to be exceeded more than once per year
NITROGEN DIOXIDE	Annual arithmetic avg. concentration	.05 ppm (100 ug/m^3)	.05 ppm (100 ug/m^3)	100 ug/m^3 (0.05 ppm)	Max. annual arithmetic mean
				200 ug/m^3 (0.10 ppm)	Max. 1-hr. conc. not to be exceeded over 1 percent of the time in any 3-month period
LEAD	Quarterly arithmetic mean		1.5 ug/m^3	1.5 ug/m^3	Quarterly arithmetic mean

Sources:

National Ambient Air Quality Standards. 1978.
North Dakota Air Pollution Regulations. 1978.

excess of 250 tons/year, then the source consumes PSD increment (i.e., these sources do not have to meet PSD regulations, but, the emissions from these sources are counted against PSD increment). Table 13 shows Federal and State PSD standards.

During peak production of the mine an estimated 6,297 tons per year would be emitted, with the best available control technology applied. Fugitive dust sources would account for 97 percent of the peak production emissions.

Dispersion modeling was performed to predict particulate concentrations for comparison with State and National Ambient Air Quality Standards. Areas within the active mining area, such as the mine facilities, pit area, and reclamation areas, are not subject to these standards.

The isopleth lines on Figure 6 indicate annual average particulate concentrations that could result during peak production; the highest concentration at a location off the mine site could be 18.7 ug/m^3. This level would consume the allowable Class II PSD annual increment for particulates. With the annual background concentration added (22 ug/m^3), the ambient level should not exceed State or Federal Ambient Air Quality Standards.

In addition to the annual particulate standard of 60 ug/m^3, North Dakota has a 24-hour standard of 150 ug/m^3 that cannot be exceeded more than once per year off the mine site. Figure 7 shows the predicted highest particulate concentrations for 24-hour averaging times, resulting from the proposed action. The predicted highest 24-hour values associated with the proposed action during peak production could be as high as 140 ug/m^3. This level would consume the allowable Class II PSD 24-hour increment for particulates. With the estimated 24-hour background concentration added (80 ug/m^3), the ambient level would be 220 ug/m^3. This level exceeds the State Ambient Air Quality Standard and the Federal Secondary Ambient Air Quality Standard. A violation would occur if the ambient air standard was exceeded more than once per year. There is a possibility that the proposed action could violate State and Federal ambient TSP standards, but this is subject to the mine emissions and the corresponding background levels in the area.

Because the proposed action totally consumes the allowable Class II PSD increments for particulates, any associated PSD source could not contribute significantly (1 ug/m^3-annual; 5 ug/m^3-24-hour) to the PSD's Class II annual or 24-hour particulates increment.

Several small sources of gaseous pollutants are associated with surface coal mining operations.

During peak production, the relatively small gaseous emissions associated with the mining operations are not expected to violate air quality standards. Gaseous emissions for mining sources were not modeled because of their expected limited impacts to the air quality.

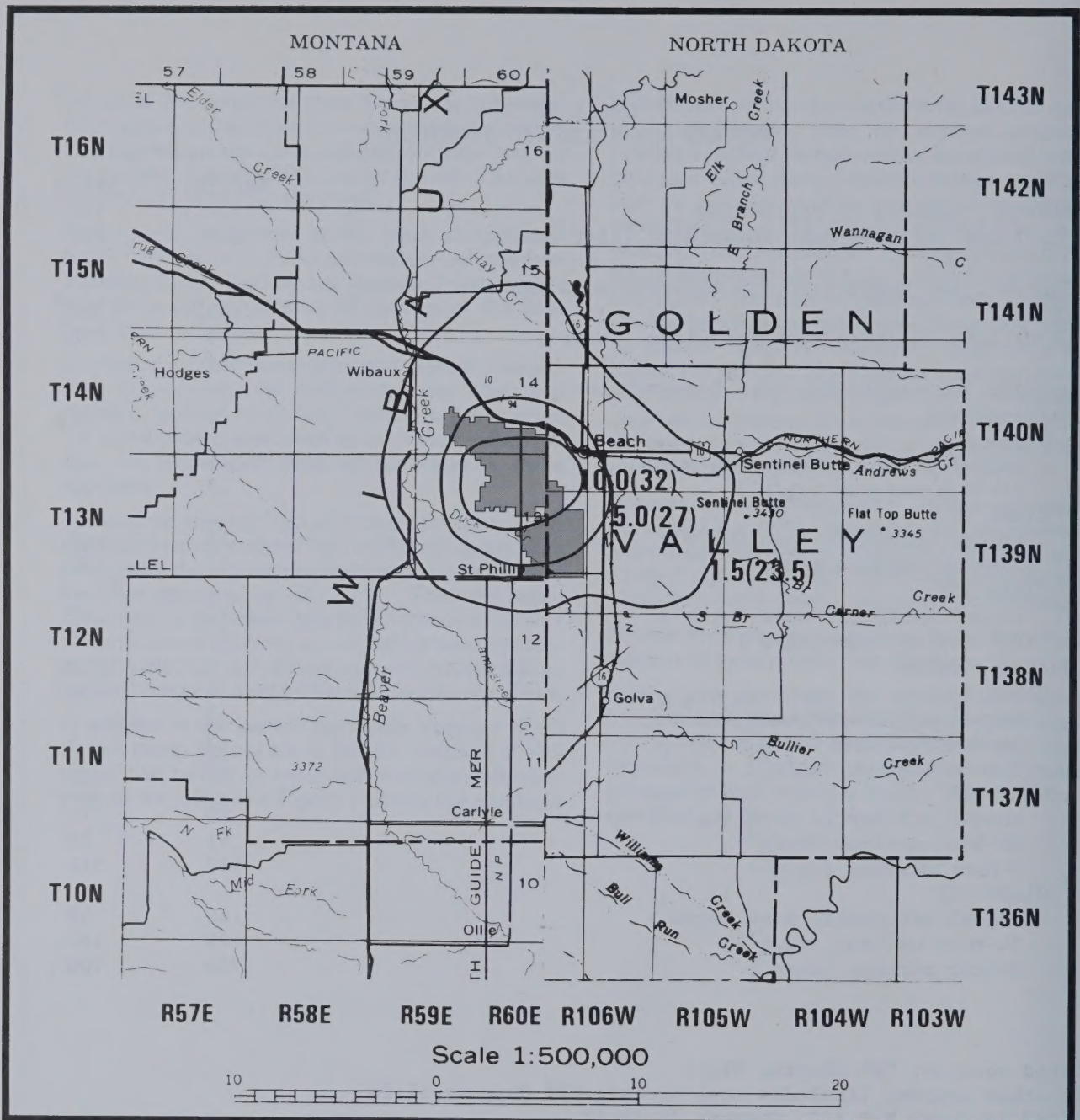
TABLE 13
FEDERAL AND STATE PSD STANDARDS

	Federal	State
Major Sources, subject to PSD review	100[1]	100[3]
(excludes fugitive dust emissions) (t/yr)	250[2]	250[4]
Major Sources, not subject to PSD review-counts against PSD increment	100[1]	100[3]
(considers fugitive dust emissions) (t/yr)	250[2]	250[4]
Deterioration Increments for Area Designations		
Particulates		
Class I		
annual geometric mean (ug/m^3)	5	5
24-hour maximum (ug/m^3)	10	10
Class II		
annual geometric mean (ug/m^3)	19	10
24-hour maximum (ug/m^3)	37	30
Class III		
annual geometric mean (ug/m^3)	37	37
24-hour maximum (ug/m^3)	75	75
Sulfur Dioxide		
Class I		
annual arithmetic mean (ug/m^3)	2	2
24-hour maximum (ug/m^3)	5	5
3-hour maximum (ug/m^3)	25	25
Class II		
annual arithmetic mean (ug/m^3)	20	15
24-hour maximum (ug/m^3)	91	91
3-hour maximum (ug/m^3)	512	512
Class III		
annual arithmetic mean (ug/m^3)	40	40
24-hour maximum (ug/m^3)	182	182
3-hour maximum (ug/m^3)	700	700

1. Listed sources; CFR Chapter 51:24
2. All other sources (includes coal mines); CFR Chapter 51:24
3. Listed sources; N.D.A.C. Chapter 33-15-15
4. All other sources (includes coal mines); N.D.A.C. Chapter 33-15-15

*SOURCES

Prevention of Significant Deterioration of Air Quality. 1978. Chapter 33-15-15 NDAC
Requirement for Preparation, Adaption and Submittal of Implementation Plan. 1978. Title 40 CFR, Part 51.



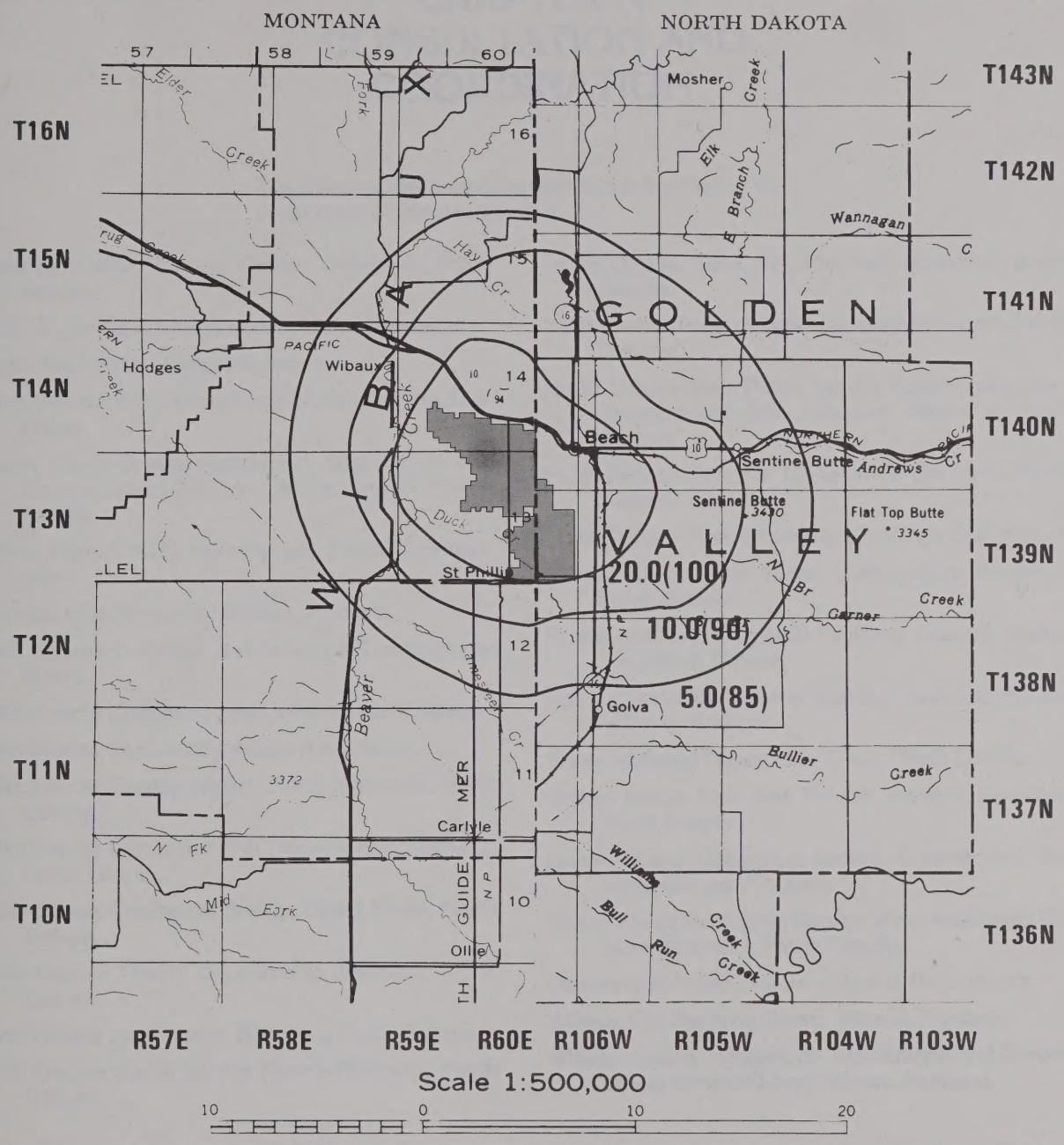
South Wibaux-Beach Tract

TSP Annual Average Concentration (ug/m^3) Isopleths

N

Note: Number in parenthesis indicates predicted concentration plus background concentration.

FIGURE 6



South Wibaux-Beach Tract

TSP Maximum 24-hour Concentration (ug/m^3) Isopleths

Note: Number in parenthesis indicates predicted concentration plus background concentration.

FIGURE 7

CHAPTER IV
CONSULTATION AND COORDINATION

The following organizations were consulted during the production of this document.

Badlands Human Service Center; Dickinson, North Dakota.

Beach Water Department; Beach, North Dakota.

Cumin Associates; Billings, Montana.

Eastern Montana Social and Community Services Task Force.

Golden Valley County Agricultural, Stabilization and Conservation Service Office; Beach, North Dakota.

Golden Valley County Planning and Zoning Commission.

Mountain West Research; Billings, Montana.

North Dakota Business and Industrial Development Board.

North Dakota Combined Law Enforcement Council.

North Dakota Community Action Association.

North Dakota Energy Impact Office; Bismarck, North Dakota.

North Dakota Game and Fish Department; Bismarck, North Dakota.

North Dakota Geological Survey; Grand Forks, North Dakota.

North Dakota Health Department; Bismarck, North Dakota.

North Dakota Job Service; Bismarck, North Dakota.

North Dakota Social Service Board; Bismarck, North Dakota.

North Dakota State Fire Marshall; Bismarck, North Dakota.

North Dakota State Historical Society; Bismarck, North Dakota.

North Dakota State Public Service Commission, Reclamation and Siting Division; Bismarck, North Dakota.

North Dakota State Tax Department; Bismarck, North Dakota.

North Dakota State University, Sociology Department.

North Dakota State Water Commission; Bismarck, North Dakota.

Roosevelt-Custer Regional Planning Council; Dickinson, North Dakota.

Soil Conservation Service; Beach, North Dakota and Wibaux, Montana.

Three Affiliated Tribes; New Town, North Dakota.

United States Fish and Wildlife Service; Bismarck, North Dakota.

United States Geological Survey, Conservation Division; Billings, Montana.

United States Geological Survey, Water Resources Division; Bismarck, North Dakota.

University of North Dakota, Office of Rural Health.

Wibaux City Planning Board; Wibaux, Montana.

Wibaux County Agricultural, Stabilization and Conservation Service Office; Wibaux, Montana.

BLM Library
Denver Federal Center
Bldg. 85, OC-521
P.O. Box 25047
Denver, CO 80225

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SUMMARY MATRIX
SOUTH WIBAUX-BEACH TRACT
RESOURCE AND ENVIRONMENTAL CONSIDERATION

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Topography	Gently rolling hills	Shallower slopes with slight alteration of minor drainage patterns	Low	Good	
Geology and Minerals					
Geologic Hazards	None identified	None	N/A	Good	
Potential for Other Minerals	Medium-this tract located near Wibaux oil field.	Moderate-there is ongoing exploration activity and an abandoned field in the area.	Mining could interfere with development of the oil and gas.	Good	
Paleontological Resources	Low-none identified to date.	Will improve knowledge of the resources near the mine.	Low	Good	
Soils and Reclamation Potential					
Soil Erosion Potential	Wind-mod-high over much of tract. Water-low-mod over much of tract.	Possibly slight increase during soil handling operations but decrease during other stages of mining.	Minimal	Outstanding-Golden Valley County Soil Survey-1979.	
Toxic Elements in Soil	No problems	No problems	None	There has not been a need for this data.	
Chemicals Corrosive to Metal or Concrete in Soil	Corrosivity of most soils to untreated steel mod to high; concrete-low to mod.	No problems	None	Outstanding-Official Soil Series Descriptions give corrosivity of each soil.	

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Highly Saline/ Sodic Soil Conditions	There are some small scattered areas of saline/ sodic soils in the tract.	These areas can possibly be improved through mining by replacing with better soil, improving drainage, etc.	Minimal	Outstanding-Good based on soil surveys named above.	
Character of Subsurface Materials and/or Interburden	Two cores in north end of tract. Textures-medium to fine; salts-low; sodium-medium to high; pH-alkaline.	Some instability problems (settling, piping) may appear after reclamation.	Minimal	Unsatisfactory to acceptable	Instability problems have been and continue to be researched at active mines.
Reclamation Potential				Outstanding	
Based on the soil suitability for cover of surface mined land, the chances for successful reclamation appear to be high. The breakdown of soil suitability within the tract is as follows: Good - 10,911 acres, 72%; Fair - 3,361 acres, 22%; Poor - 838 acres, 6%. Precipitation could be a limiting factor for reestablishing vegetative cover some years.					
Hydrology					
Drawdown of Shallow Groundwater Levels	Many wells in and surrounding the tract rely on shallow groundwater for domestic and livestock supplies.	Wells finished in the mine disturbance zone near an open pit will have lowered water levels during mining.	Will affect between 30 and 60 wells used for domestic and stock water supplies.	Hydrology - Outstanding Well inventory - Acceptable	This will be a short term impact that will only occur to a few wells at a time as mining progresses through the tract.
Degradation of Groundwater Quality	Lignite water does not meet Public Health Service drinking water quality standards. It is acceptable for domestic and stock water purposes since it is the best practical source.	Groundwater quality will be degraded in the tract and this impact can move down gradient into the surrounding unmined aquifer.	Will affect between 50 and 90 wells used for domestic, municipal, and stock water supplies.	Inventory - Outstanding well Inventory - Acceptable down gradient impact Prediction - Unsatisfactory	The long term impact of how far down gradient poor water quality will move is not known. Replacement supplies are available.

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Vegetation					
Cropland	There are 7,907 acres of land in the tract that are currently being cropped.	Average annual loss of 241 acres excluding 4.223 total acres of summer fallow. Annual production on this 241 acres would be 7,085 bu. of wheat. Maximum loss in any one peak mining year would be 2,438 to 3,657 acres and 75,677 to 107,516 bu. of wheat.	Moderate to high depending upon individual operation. Low to moderate for overall tract production.	Outstanding	
Rangeland	Average annual production is 357 AUMs.	Average annual loss of 9 AUMs. Each acre would be out of production from 10 to 15 years. Maximum loss for any one peak mining year would 171 to 257 acres and 86 to 129 AUMs.	Moderate to high depending upon individual operation. Low to moderate for overall tract.	Outstanding	
Agriculture	There are 36 operators in the tract.	The same number of operators will be affected, to varying degrees, by a long term but temporary loss of acreage for agricultural production.	Very significant to the operators involved.	Outstanding	
	17% of the involved operators' acreage is in the tract.			Outstanding	
	61% of the acreage in the tract is operated by lessees.	Nonowners will lose the use of their leased acreage with no compensation.	Significant to nonowners	Outstanding	

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Threatened or Endangered Species	There are no threatened or endangered species (on the Federal List) in the tract.	None	None	Good	
Land Use	Agricultural, local roads and utilities, a 230 kv transmission line, a gas pipeline.	Displacement of existing agricultural use in the short term.	See Vegetation/Agriculture section	Acceptable	
		Relocation or bypass of existing roads and utilities.	Insignificant		
		Expansion of nearby towns would displace agricultural use; these changes considered permanent.	See Economic & Social section		
Recreation Values	Less than 5% of tract used for recreation.	Loss of recreational areas and added stress on available recreational opportunities.	Limited recreational opportunities make impacts significant.	Good, based on current studies.	
Aesthetics	Agricultural lands, dynamic of high aesthetic but low scenic value. Highly visible from Interstate 94, especially eastbound. Views intermittant. Not visible from much of Wibaux and Beach.	Loss of visual amenity along an Interstate highway but probably acceptable as part of the characteristics of the region.	Significant loss of amenity aesthetically in short term. Insignificant effect on scenic values and in long term.	Acceptable	

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Wildlife					
Sensitive and Essential Habitats	Extensive farming has altered the ecosystem on about 85% of the area, leaving remnant wetlands, native prairie and shrublands. About 400 acres of "pothole" wetlands and some intermittent streams are most valuable. Little Beaver and Beaver Creeks are significant offsite aquatic habitats. Whooping crane migrate through the area. There are about 14 Uncommon and Sensitive Species (Montana and North Dakota) in the area.	Complete destruction of native prairie, wetlands, and some shrublands would be of local and regional importance to wildlife resources. Loss of wetlands and native prairie would be an irreplaceable loss, based on the current knowledge about habitat recreation. Agriculturally disturbed lands provide limited essential habitat for wildlife population.	Destruction of the natural wetlands would be an irretrievable commitment of wildlife resources. Native woodlands are of the same value and strip mining effects would be the same as for wetlands. Native prairie would require 50-100 years or more to reestablish.	Acceptable to good.	Complete loss of wetlands, native prairie and shrublands through strip mining and conversion to farmland and mining would be a significant loss to the affected area and the wildlife resources. If some forms of habitat replacement is accomplished during mining and thereafter, then the negative impacts to the wildlife resources would be proportional to the success of compensation.
General					Increased poaching and disturbance would significantly reduce all wildlife populations in the region. If not controlled, it would significantly reduce recreation opportunities.
Cultural/ Historical Values	No specific data available. Resources are very likely on the tract.	Loss of sites as a result of mining activity.	Unable to establish because no specific data is available.	No data is available, therefore, data is unsatisfactory.	Tract to be sample surveyed in summer of 1981 if requested contract is allowed.

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Net Energy Analysis	No fossil fuels are being produced from this tract.	A total of 14.0 million tons of coal (3.22 million tons of federal coal) will be produced annually.	Production: 5966 Btu/lb. of coal Consumption: 37.7 Btu/lb. of coal Ratio of production to consumption: 158:1	Acceptable	
Climate and Air Quality	Good	Possibility that proposed action could violate State and Federal ambient TSP standards. Totally consumes the allowable class II PSD increment for particulates.	Significant	Fair	Any associated PSD source could not contribute significant (lug/m^3 - 24-hour) to the PSD's class II annual or 24-hour particulate increment.

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
		Social and Economic Conditions			
Employment	Communities of Wibaux and Savage, Montana and Beach, Golva, and Sentinel Butte, North Dakota having problems adequately serving present employment/ population.	Employment increases will occur in Savage, Wibaux, Lambert, Montana, and Sentinel Butte, Beach and Golva, North Dakota.	High employment changes - Beach, Golva, Sentinel Butte, and Wibaux. Moderate employment changes - Lambert and Savage.	Outstanding	
Population	Communities of Wibaux and Savage, Montana and Beach Golva, and Sentinel Butte, North Dakota are having problems adequately serving present populations.	Population increases will occur in Savage, Wibaux, Lambert, Montana and Sentinel Butte, Beach, and Golva, North Dakota.	High population changes - Beach, Golva, Sentinel Butte, and Wibaux. Moderate population changes - Lambert and Savage.	Outstanding	
Regional Income	$5172 estimated regional income per capita.	Minor increase in regional per capita income.	Insignificant	Acceptable	

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Infrastructure Assessment (Community Services)	Lambert - no inadequate services Savage - 2 inadequate services Wibaux - 2 inadequate services Beach - 2 inadequate services Golva - 3 inadequate services Sentinel Butte - 4 inadequate services	Full Operations 1993 Lambert with tract - 4 inadequate services w/o tract - 4 inadequate Savage with tract - 5 inadequate services w/o tract - 5 inadequate Wibaux with tract - 10 inadequate services w/o tract - 2 inadequate Beach with tract - 8 inadequate services w/o tract - 0 inadequate Golva with tract - 3 inadequate services w/o tract - 1 inadequate Sentinel Butte with tract - 1 inadequate services w/o tract - 0 inadequate	Highly significant due to number of services becoming inadequate with tract development as well as types of services which will become inadequate (e.g., sewage collection, water storage/ distribution, police and fire protection, etc.)	Good	Community services which are inadequate without tract-related population growth would experience additional strains due to increased demands on an inadequate service situation. Based on assessment of 15 community services.

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Perceptions of community services.	Wibaux County - Medical care, services for the elderly, and law enforcement identified as service problems. Golden Valley County - Elderly services, expansion of school system and retail opportunities identified as service problems.	Not Applicable	Not Applicable	Unsatisfactory	
Social attitudes	Wibaux Golden Valley counties - 28 interviews Wibaux Residents-1/3 neutral or unsure about local coal development. Officials-almost completely supportive of mining. Golden Valley Residents-2/3 favored development unconditionally or with qualifications. Officials- 1/2 favored development unconditionally or with qualifications. Stated concerns-Assurance of successful reclamation, protection of agricultural land, quality of education, increased crime, adequate housing.	Not Applicable	Not Applicable	Unsatisfactory	

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Quality of Life	Wibaux Golden Valley Favorable characteristics-social atmosphere. Unfavorable-harsh climate, crime, shortage of medical facilities and outdoor recreation opportunities.	-informality, lack of stress and crowding would be less evident. -shortage of medical services and increase in crime would be more evident.	Noticeable change in social atmosphere.	Unsatisfactory	

SOUTH WIBAUX-BEACH TRACT
UNSUITABILITY CRITERIA RESULTS

Criterion	Applicable to Tract	Exception Used (if applicable)	Additional Data Needed	Comments
1. Federal land systems	No	---	No	---
2. Rights-of-way and easements	No	---	No	None
3. Buffer zones	Yes	---	No	Exceptions may be applied at mine plan
4. Wilderness study areas	No	---	No	---
5. Scenic areas	No	---	No	---
6. Land used for scientific studies	No	---	No	---
7. Historic lands and sites	Yes	---	Yes	Original information being updated
8. Natural areas	No	---	No	---
9. Federally listed endangered species	Yes, additional information may change designation.	---	Yes, migration inven-, tories, prairie dog town inventories and ferret surveys.	Whooping cranes migrate through the area.
10. State listed endangered species	No	---	No	Does not exist.
11. Eagle nests	No	---	No	---

Criterion	Applicable to Tract	Exception Used (if applicable)	Additional Data Needed	Comments
12. Eagle roosts and concentration areas	No	---	No	---
13. Falcon cliff-nesting sites	No	---	No	---
14. Migratory birds	Yes, additional data may change designation.	---	Yes	There are four or five wetlands on the tract not reported in the MFPs.
15. State resident fish and wildlife	Yes, additional data may change designation.	---	Yes	Same as above.
16. Flood plains	No	---	No	---
17. Municipal watersheds	No	---	No	---
18. National resource waters	No	---	No	---
19. Alluvial valley floors	No	---	No	---
20. State proposed criteria	No	---	No	None exist.

PRELIMINARY FACILITY EVALUATION REPORT

PRELIMINARY

FACILITY

EVALUATION

REPORT

PRELIMINARY FACILITY EVALUATION REPORT

GOALS AND OBJECTIVES

The Fort Union Regional Coal Team, in its consideration of leasing federal coal, will address the likely coal end-uses and their implications. The purpose of evaluating how the coal will be used is to present the most probable major impacts of development.

The end-use facility evaluations are at a reconnaissance level and the reports are presented only as general approximations of facility characteristics and impacts.

The uncertainty of actual end-use facilities and the inherent problems in defining a "typical facility" limit end-use analysis to broad generalizations. The evaluations are not meant in any way to substitute for detailed site specific evaluations, EISs, or analyses which come later when mining and facility projects are actually proposed. The end-use facility evaluations will not preclude any federal, state, local, or private decisions concerning actual end uses, facility siting, or end-use restrictions. The end-use reports are meant only to provide additional information to be used in decisions concerning the leasing of federal coal in the Fort Union Region and should not prejudice any later decisions.

End-use evaluations, referred to as preliminary facility evaluation reports, have been prepared for those tracts for which a new coal-use facility is expected to be built. One of the three proposed end-use facilities has been assigned to those tracts based on expressions of interest, tract size, or existing facilities. The typical facilities to be considered are: a 250 million standard cubic feet per day gasification plant; a 1,000 megawatt electric power generation plant; and an 85,000 barrel per day indirect coal liquefaction plant.

Part I of the report summarizes what the assigned typical end-use facility might be like. The description of the facility gives plant size, process technology, plant requirements (fuel, land, water, power), emissions, and other characteristics of facilities likely to be proposed in the Fort Union Region. The description includes ancillary facilities and a discussion of construction and operational aspects of the facility that are relevant to determining impacts that could occur in the vicinity of the tract.

The facility description is based on existing analyses, studies, environmental impact statements, and consultation with State and industry representatives. Part II of the facility report is an analysis of the facility impacts on the tract area.

The preliminary facility evaluation reports will be used by the Regional Coal Team to rank federal coal tracts with a better understanding of likely future development impacts and implications.

PART I
ASSUMPTIONS AND VARIABLES

The typical gasification facility characteristics are based on numerous assumptions and reasonable values for important variables. Some of the assumptions and variables are based on best estimates. Others are based on existing literature, facilities, and on input from industry sources.

Facility Location, Type, and Size

Because of the economics of lignite coal, it was assumed in the early stages of the Fort Union coal leasing process that the end-use facilities would be near the tracts to be leased. The energy value of lignite coal as well as the water content make the transporting of lignite for long distances uneconomical. For purposes of issue level impact analysis, the gasification facility assigned to the South Wibaux-Beach tract is not specifically located but assumed to be near the tract. Such an assumption will eliminate the problems of arbitrarily siting facilities. Facilities were sited, however, for the air quality modeling. Where specific site location information was available from potential project developers, it was used in the facility analysis.

The typical gasification plant, using the Lurgi gasification process, would produce approximately 250 million cubic feet per day of synthetic gas. Industry proposals indicate the Lurgi process would likely be used for gasification plants built in the Fort Union Coal Region during the next decade. Many of the other assumptions and variables are based on the characteristics of the proposed Great Plains Coal Gasification project, which will use the Lurgi process.

Construction Period

The construction time span for a synthetic fuel facility can vary greatly. A company hiring four to five thousand construction workers could complete the proposed facility in as short a time span as three years. A company could choose to lengthen the construction period or build parts of the plant capacity in two or more construction phases. This would reduce the construction work force and spread construction over as many as ten years.

The assumption is that the facility will be constructed in five years. Work force numbers were supplied by the Tenneco Coal Gasification Company.

Water Requirements

Water demands for a coal gasification facility depend on production technology, operation time, and water quality. The values used for water requirements are based on estimates from Tenneco. The value for gallons per minute is an estimate of average water use for the facility. The yearly requirements are an approximation based on an operation factor assumed for the facility. This operation factor indicates the time the facility will be in operation each year.

For analysis purposes, water for the gasification facility is assumed to come from the Yellowstone River.

Emissions

The air emissions for the gasification plant will depend primarily on the facility's production process, the amount and quality of coal burned, the level of pollution control, and whether or not the facility produces its own electric power.

An important assumption is the source of a facility's electric power. It will be assumed that the gasification facility will produce its electric power on the plant site with coal fired boilers and steam turbines.

An assumption affecting air emissions from a generic facility is the quality of the coal. The sulfur, ash, and water content of the lignite will not only influence emissions per ton of coal burned, but will also determine the amount of coal required for a given facility. The amount of coal required for a generic gasification facility could vary from 11 to 14 million tons per year depending on the coal quality and certain process characteristics.

The air emissions from any type of coal conversion facility will be a function of the conversion process characteristics and the emission control technology used at the facility and the level of control used. The possible variation is evident when the emission rates for the Great Plains Coal Gasification and Nokota Methanol facilities are compared. The two facilities will produce approximately equivalent amounts (Btu values) of gas and methanol. The emissions for the two facilities are expected to vary considerably, due to the difference in the level of emission control planned for each facility.

The impacts resulting from air contaminants emitted by the coal end-use facility are deduced by using established air quality standards above which deleterious effects of the contaminants are implied to occur. A facility's ability to meet air quality standards assumes there would be no significant deleterious effects to human health, animals, or vegetation. Such an assumption is the subject of continuing discussion and is disputed by certain research studies. A more detailed discussion of this issue can be found on pages 37-94 in the Final West-Central North Dakota Regional Environmental Impact Study on Energy Development (October 1978). The facilities could also emit certain pollutants for which there are no standards. The anticipated levels of air quality concentrations of contaminants are obtained by measuring existing levels of air quality and adding computer simulation of the atmosphere loading resulting from the end-use facility.

The air quality impacts are considered in terms of ambient air standards and prevention of significant deterioration standards. Under authority of the Clean Air Act of 1970, the State of North Dakota has promulgated its own ambient air quality standards which are equal to or more stringent than the Federal standards. The purpose of the North Dakota Ambient Air Quality Standards is to control the quality of the air over North Dakota such that, a) the health of sensitive and susceptible segments of the population will not be adversely affected; b) concentrations of pollutants will not cause public nuisance or annoyances; c) significant damage to animals, ornamental plants, forest and agricultural crops will not occur; d) visibility will not be significantly reduced; e) metals or other materials will not be significantly corroded or damaged; f) fabrics will not be soiled, deteriorated, or have their colors affected; and g) natural scenery will not be obscured.

In May of 1977, the North Dakota State Department of Health (NDSDH) received a delegation of responsibility from the Environmental Protection Agency (EPA) for administration of the Prevention of Significant Deterioration (PSD) program and regulations adopted by EPA. The NDSDH had previously adopted PSD regulations, recognizing that the protection of the air quality resource was in the interest of preserving a quality of life and the environment both endowed to North Dakota's citizens.

During 1975, 1976, 1977, and 1978, the NDSDH received applications for and granted air quality permits to new sources in west-central North Dakota. All new sources placed into operation after January 6, 1975, are subject to the provisions of the PSD regulations of EPA and adopted by the NDSDH.

The Clean Air Act Amendments of 1977 designated three levels of allowable deterioration of air quality in regions where air quality was better than the National Ambient Air Quality Standards. All of North Dakota was defined as a Class II area with exception of four smaller areas which were defined as Class I areas. These Class I areas are the Theodore Roosevelt National Park north unit, south unit, and Elkhorn Ranch and the Lostwood National Wildlife Refuge.

The assessment analysis of proposed air quality impacts (deterioration) by proposed new sources is achieved with computer models. These models simulate the physical processes of atmospheric transport,

dispersion, chemical transformation, and removal of air contaminants with resulting levels of concentrations of the contaminants. Modeling has been and remains the only tool available to determine air quality impacts of proposed sources or source modifications, since these new sources are not yet producing air contaminant emissions.

The computer modeling assessments of impacts led the NDSDH to declare in 1979 that the increment of allowable Class I area air quality deterioration for sulfur dioxide (SO_2) had been consumed and allocated to the new sources which had been granted construction permits from 1975. This decision further implied that no additional sources could construct and operate within the geographic corridor bounded by the units of the Theodore Roosevelt National Park and the sources located eastward.

An extensive, detailed discussion of the preceeding paragraphs has been published in the Final West-Central North Dakota Regional Environmental Impact Study on Energy Development (October 1978). Copies are available from the NDSDH.

Recently, several applications for permits to construct air pollution sources have been submitted to the North Dakota State Department of Health. According to the applicants' analyses, which utilize more advanced modeling techniques, compliance with all applicable standards was demonstrated.

The NDSDH is currently evaluating these applications as to the appropriateness of the air quality technique. The Department is concurrently establishing its own mesoscale air quality modeling technique in an attempt to standardize the methodology and air quality modeling input data variables. Once this has been accomplished, the actual merits review for each new application can begin.

The limiting case appears to be the question of increment consumption over the Theodore Roosevelt National Park, a Class I area. Ambient Air Quality Standards and PSD Class II increments have not previously prevented the granting of an air quality permit.

At this point in time, no new conclusion regarding the status of the Class I increment has been reached by the NDSDH. If any increment remains, permits would be granted, probably on a first-come first-serve basis, to as many of the applicants as the available increment would allow. Should the NDSDH continue to find that the increment has been consumed, no permits to construct would be granted.

If permits are not granted, the applicants may pursue the variance procedures provided by the Clean Air Act and State Regulations. Applicants may also decide to pursue an offset mechanism which would best suit their individual situation(s).

Given the above existing new source situation, the quantification of air quality impacts resulting from additional facilities associated with certain coal lease tracts is impossible. Discussion of site specific impacts without addressing the interactive and cumulative impacts would have little decision value.

For the purpose of this analysis, each end-use facility which has been assigned to a particular coal lease tract will be discussed. This discussion will contain general statements regarding facility impacts on the air quality. Impact analysis will be based on previous air quality modeling experience and past actions by the Department in permitting similar facilities. Comparisons to applicable standards can be accomplished. For example, when considering these facilities (electrical generating facility or synfuel facility) by themselves, the Ambient Air Quality Standards can be met. Also, the PSD Class II Standards can be met. This is known because these types of facilities have been permitted in the past.

The general statements will be appropriate only within the context of some qualifying conditions. A facility's impact on a given receptor is directly proportional to its distance from that receptor. Generally speaking, the closer a facility is to a receptor, the greater its impact. Therefore, considering the given type and size of facilities, a screening ,modeling exercise must be undertaken in order to determine the distance a facility must be removed from the park in order to meet the Class I Standard. This distance will be compared to the distance each end-use facility associated with the coal lease tract is from the Class I area.

The approach mentioned above will only demonstrate compliance/noncompliance with the applicable standards without consideration of interaction with other sources. This analysis cannot be substituted for a detailed permit review and care must be taken to use this information with the proper qualifiers and not be taken out of context.

Solid Wastes

Estimates of solid wastes from the facility are based on figures from ANG. Estimates for ash and sludge could vary considerably depending on the ash content of the coal and the pollution control technology used. Planned facilities are proposing to dispose of solid wastes in the nearby mines.

GASIFICATION FACILITY

Introduction

A typical lignite coal gasification plant would use the Lurgi gasification process to produce an average of 250 million standard cubic feet per day of synthetic gas. The gasification complex situated near its coal source would consist of the following major areas: 1) coal preparation, storage, and handling; 2) gasification units; 3) process facilities; 4) pollution control facilities; and 5) ancillary facilities. (See Figure 1.)

The total land area dedicated to the gasification plant site would be about 960 acres. Major structures would include: 1) buildings to house the gasifiers; 2) coal preparation facilities; 3) boiler plant; 4) boiler stack; 5) compression building; 6) other buildings—administration, shops, warehouse; 7) ponds for clarified water storage, process water, and storm water catch basin; and 8) distillation and absorption columns.

Lignite received directly from the nearby mine by truck or conveyor would be crushed, sized, and sent to storage piles. When needed, the coal would then be resized, weighed, and sent by conveyor either to the gasification plant or to the steam generation area.

The supporting process facilities would include steam generation and distribution, power generation and distribution, oxygen production, raw water supply and water treatment, and fire protection. The waste water treatment system would be designed for maximum reuse within the plant. No waste water would be discharged to surface waters. Gaseous waste streams would be treated prior to discharge from a 500 foot stack. Waste solids from coal processing, waste water treatment units, and from the ash handling system would be dewatered and disposed of at the mine. By-products such as sulfur, oil, phenol, ammonia, and tar would be recovered, stored, and either consumed in the plant or sold. A water intake pipeline would draw water from a nearby source. Water would be used in the gasification process, in steam generation, in cooling, and for plant utility and sanitary purposes. There would also be a product gas pipeline to transport the gas away from the facility. Other ancillary facilities would be roads and a railspur.

Employment

The construction of a gasification facility would last five years. Peak employment would be in the third year. Table 1 shows average yearly employment for phased construction. Once the facility is in full operation, it would employ approximately 1,050 workers.

TABLE 1
AVERAGE YEARLY EMPLOYMENT

Year	1	2	3	4
Construction	700	2800	3200	3200
Permanent				
Year	**5**	**6**	**7**	**8**
Construction	400			
Employment		1050	1050	

Source: The Tenneco Coal Gasification Company.

Coal Preparation, Storage and Handling

The coal receiving system would include crushing, weighing, and sampling. The coal would then be conveyed to either an active or inactive storage pile. The inactive storage pile would amount to a 30-day supply and would only be used during extended shutdowns in the mine. The live storage pile would feed the plant on a day-to-day basis. The gasification plant would require approximately 13.5 million tons of coal to be mined each year. Coal fines not used in the gasifiers would be used for steam and power generation. See Figure 2.

Gasification Process

In the gas production section, coal, steam and oxygen are reacted under conditions of controlled temperature and pressure to produce a crude gas containing methane, hydrogen, carbon monoxide, carbon dioxide, excess steam and various by-products, and impurities. Before leaving the gas production section, the hot crude gas is cooled and scrubbed to partially remove impurities. The ash is sent to disposal. The crude gas from the gas production section is split into two streams. One stream is sent to the shift conversion section. The other stream bypasses the shift conversion section and is sent to the gas cooling section. The shift conversion section adjusts the hydrogen-carbon monoxide ratio in the crude gas stream. The shifted gas is then also sent to the gas cooling section. In addition to lowering the temperature of these two gas streams before they are combined, the gas cooling section also removes more by-products and impurities. The combined gas streams are sent to the gas purification section which removes naphtha and acid gases (carbon dioxide and hydrogen sulfide). The stream is then sent to the methanation section to upgrade the heating value of the gas feed stream from the gas purification section. The upgraded synthetic gas is then passed once more through the gas purification section.

Finally, the clean product gas is sent to the product gas compression section where it is compressed to pipeline pressure.

Figure 1

TYPICAL COAL GASIFICATION PROCESS

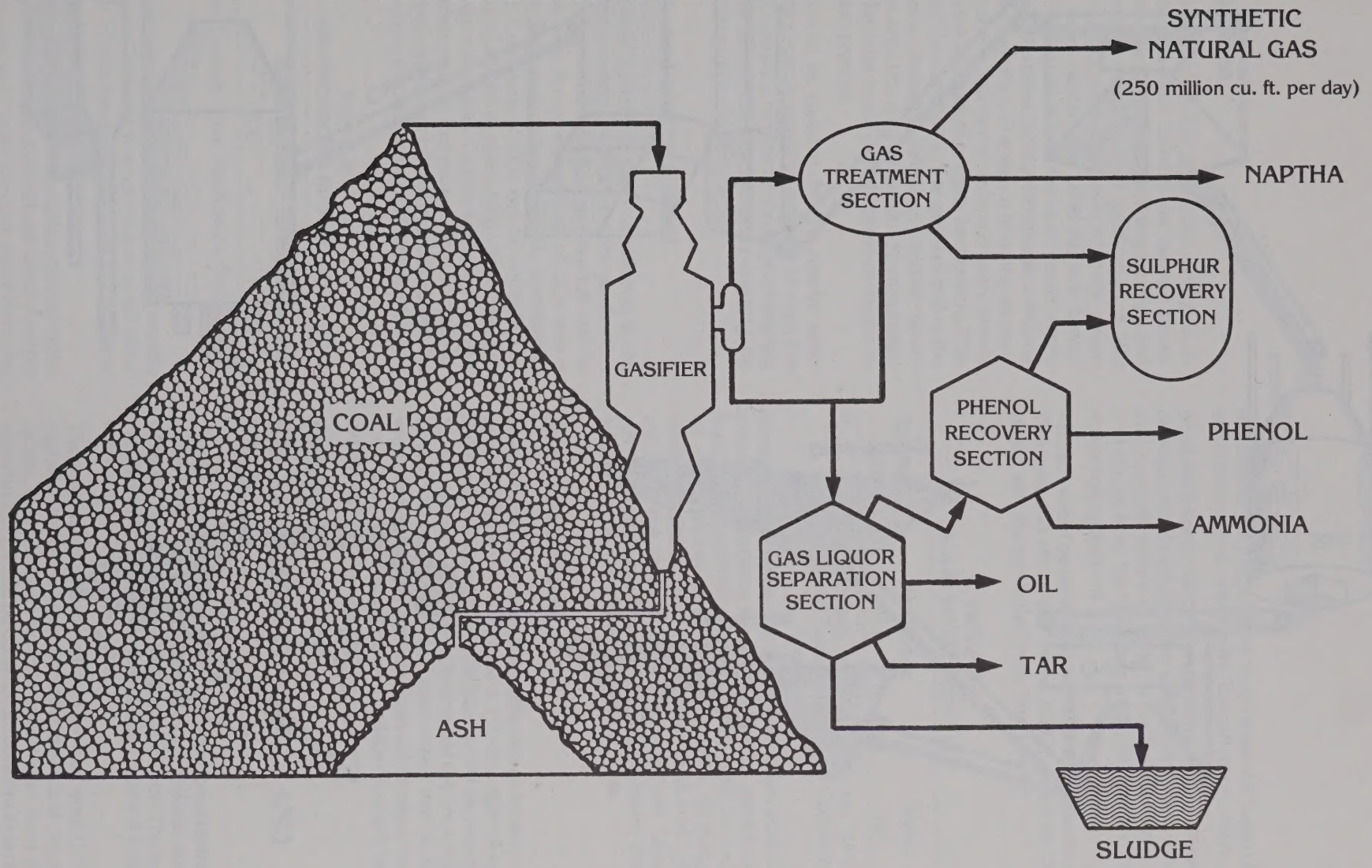
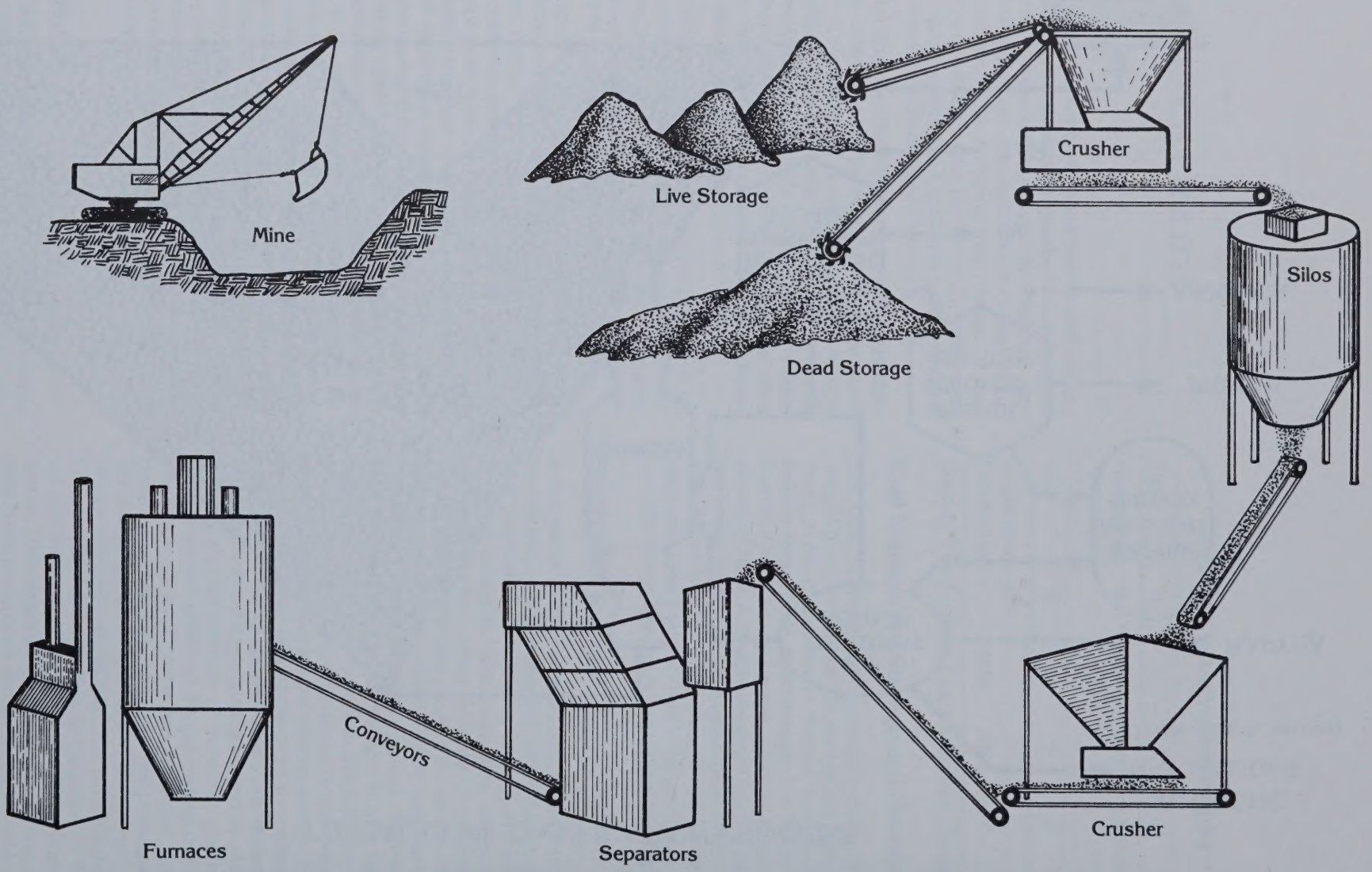


Figure 2

COAL HANDLING SYSTEM



Process Facilities

The main boiler plant for the gasification facility would generate steam to drive turbines for electric power generation, to drive compressors and large pumps, and to supply process steam for coal gasification. A 500 foot stack would disperse flue gases from the steam boilers, the super heater, and other heaters. Steam generated in the high pressure boilers will power extraction condensing turbines driving the three air compressors in the oxygen plant. The steam from the air compressor turbines will be combined with steam generated in the methanation waste heat boilers. This steam will then be supplied to the gasifiers and to the turbine drivers. Average operating electric power requirements would be approximately 150 megawatts. The oxygen facilities would provide gaseous oxygen to the gasification process.

Raw water would be piped in from a nearby water source. Pump capacity would be installed to meet the normal plant operating requirements of approximately 7,500 gallons per minute. The raw water entering the plant is processed in a clarifier.

Emissions and Pollution Control

The two principal sources of gaseous effluents at the facility—gaseous waste streams from the gasification process and the combustion flue gas streams—will be treated to reduce the concentrations of SO_2 with a scrubbing system and particulates with electrostatic precipitators. Emissions of NOx can be controlled by means of mixing and flame quenching techniques. See Table 2 for emission rates. Gaseous streams containing hydrocarbons will be incinerated. The steam boiler flue gas will be treated prior to being combined with the other gas streams for discharge via the common stack.

TABLE 2
AIR EMISSIONS (lbs/hr)

Particulate	Sulfur Dioxide	Nitrogen Oxides
400	1600	1100

Source: The Tenneco Coal Gasification Company.

Water will be recovered to the maximum possible extent for reuse. That which is not recovered will either be disposed of with the solid wastes or lost as vapor from cooling processes.

Induced draft cooling towers would handle heat rejection. One tower would use clarified fresh water. Another tower would use gas liquor process water from the Phenosolvan and Gas Liquor Separation units. A third cooling tower, using clarified fresh water, would be required for the oxygen plant to eliminate the hazard of any hydrocarbons entering the oxygen plant system.

Solid wastes generated at the plant which would require disposal include ash from the gasifiers and steam boilers, inorganic salts and silt from raw water treatment, and sludge from the biological treatment unit and the scrubbing equipment.

The ash would be dewatered and returned to the mine. The salts and silt as well as the sludge would be disposed with the ash in the mine. See Table 3.

TABLE 3
SOLID WASTE (tons/hr)

Dry Ash	Dry Sludge	Water
100	18	28

Source: Estimates based on emission figures from the American Natural Resources Company.

On-site storage facilities for liquid by-products would be provided. Anhydrous ammonia would be stored as a liquid at atmospheric pressure. Tar by-products could be utilized as fuel within the plant or sold. All storage tanks would be located in diked areas capable of holding the entire contents of each storage tank. Liquid elemental sulfur produced in the sulfur recovery plant would be stored in a lined, heated sulfur pit.

Ancillary Facilities

A railspur would connect the facility with an existing rail system. The spur would have a 150-foot right-of-way. Rail loading and unloading facilities would be provided for by-products. The water pipeline will require a right-of-way 100 feet in width for construction and 50 feet wide permanently. The product gas will be piped from the plant to an existing pipeline system and will have similar right-of-way requirements.

PART II
RELATIONSHIP OF TRACT AND FACILITY

The South Wibaux-Beach tract lies approximately three miles south and west of Beach, North Dakota, straddling the North Dakota-Montana state lines. The tract consists of 15,110 acres of land with recoverable coal reserves of 573.6 million tons.

The likely use of coal mined from the tract would be for a gasification plant. To consider the impacts of this coal facility, it is assumed that the gasification plant described in Part I would be constructed adjacent to or near the tract with no specific site designated, except for purposes of air quality analysis.

Soils, Vegetation and Agriculture

In the South Wibaux-Beach tract area, the agricultural land consists of approximately 93 percent cropland and 7 percent rangeland. Based on 1978-1979 county averages determined from ASCS data and from BLM grazing files annual production per acre would average 29 bushels per acre of wheat, 1.2 tons per acre for hayland, and .5 AUMs per acre for rangeland.

Assuming the same agricultural land use distribution for the 960 acre disturbance estimated for a generic gasification facility, agricultural production lost on the facility site would be 13,900 bushels of wheat annually, in a worst case situation analysis, for the life of the facility.

A short-term disruption of 12 acres per mile would result during construction of an undetermined length of water pipeline. Roadways would disturb 14.5 acres per mile. A railroad spur, also of undetermined length until final siting of the facility would eliminate agriculture on 18 acres per mile for the entire life of the facility.

Erosion losses due to wind and water from ground disturbed during the construction phase of the facility, given State permitting stipulations, would not be significant. Regionally, the agricultural production lost on the 960 acre facility site also would not be significant. Because of the alkaline soils in the tract area and downwind, no deleterious acid-forming effects to the soils due to acid rains from the facility would be anticipated.

There is evidence documented in the literature (West-Central North Dakota Regional Environmental Impact Study on Energy Development, 1978) that there are potential negative impacts to vegetation and to livestock downwind from such a facility due to nitrogen oxides, sulfur dioxide, and particulate matter. Such negative impacts would be analyzed in detail at such a time as more specific information becomes available in conjunction with facility permit application with the State permitting authority.

Water

Water requirements for the gasification facility are approximately 7,500 gallons per minute or 10,000 acre-feet per year. The likely source of water for industrial use is the Yellowstone River. Water requirements of 7,500 g.p.m. are equivalent to approximately 17.3 cfs. Mean discharge of the Yellowstone River at Sidney, Montana, for 67 years of record is 13,140 cfs. Minimum discharge for the period of record is 470 cfs. Withdrawal of water would have no significant impact upon the river. Facility wastes of ash, sludge, and water disposed of in the mine do have the potential to degrade water quality if they are disposed of within the saturated zone which develops upon reclamation. Present regulations require state approval of disposal sites.

Land Use

Changes in land use include displacement of existing use, increased intensity of existing uses, and the introduction of new uses. The site of the facility is likely to displace agricultural use.

The optimum site conditions for facilities are the same as for agriculture; that is, gentle topography and soils with good drainage characteristics. The increase in population of communities results in demand for new housing, additional commercial development, and expanded public use facilities. The area of this development will likely be on off-site agricultural land. The on-site displacement of agricultural land use is discussed in the Agriculture section of this report.

Increased population would create a demand for community services as addressed in the Social and Economic Conditions section of this report. This demand implies a need to expand existing facilities and commercial establishments or to create new ones. Existing commercial establishments may suffer through the construction of new facilities outside the downtown areas. Public services would be stretched in the short-term by lack of capital to implement change due to increased population. Parking shortages, traffic congestion, and excessive wear and tear on roadways would make downtown areas less habitable. Municipal organizational structures and physical space may prove inadequate with increased population. For example: a part time mayor may be overworked, processing of permits may delay private building construction, and filing space for public records may prove inadequate.

With the influx of workers and their families, a change in the composition of the community is inevitable and demands for new forms of public and commercial facilities for shopping, recreation, and entertainment would ensue. These types of changes are likely to result in dissatisfaction by both the existing resident population and the newcomers. Conflicts are likely to occur as a result of the contrast in the lifestyles of these populations.

Existing planning varies considerably from community to community. Some are prepared for change presaged by recent oil and gas development in some areas, while others are ill prepared for the change in population anticipated.

Current perception of county residents with regard to roads, retail opportunities, recreational/entertainment facilities, and housing are discussed in detail in Chapter 2 of the Site-Specific Analysis for Economic and Social Conditions.

Similarly, forecasts by city/county planners regarding likely changes in community services resulting from facility related population growth are presented in detail in the Economic and Social Conditions section of this report.

Recreation

Recreation in the tract vicinity is limited to dispersed seasonal big game hunting. Although there are some facilities in the tract vicinity, those existing regional recreation facilities (community camping and picnic areas, Theodore Roosevelt National Memorial Park, and Lake Sakakawea) are expected to receive the majority of recreation demand. The regional EIS will address in more detail the expected regional demand from increased population for recreation.

Wildlife/Fisheries

Impacts of a gasification facility on wildlife around the South Wibaux-Beach tract could occur in two areas: 1) impacts from destruction of habitat and 2) direct and indirect impacts from the increase in human population.

The removal of vegetation for a 960 acre gasification facility and the expansion of urban areas, highways, and railroads would prevent or reduce the use of an area by wildlife regardless of the type of vegetation removed.

If powerlines, pipelines, access and haul roads are constructed in key wildlife areas, partial or total destruction of habitat would occur depending on the magnitude of development. The worst case would destroy present wildlife populations in the area. Wildlife oriented recreation such as hunting and wildlife observation would have to be sought elsewhere. Wildlife would be impacted by eagle electrocutions on powerlines, migratory bird mortality from striking power lines close to wetlands, road kills along transportation routes through important wildlife areas, harassment of wildlife by off-road vehicle use, increased poaching, and habitat destruction.

Poaching and road kills have increased dramatically in areas of North Dakota, Montana, Wyoming, and Colorado where energy development has occurred. The problem is compounded in areas where transportation corridors are located in important wildlife areas and shift changes coincide with wildlife feeding periods. This situation could occur in the South Wibaux-Beach tract area.

The impact to wildlife could be mitigated by: 1) siting the gasification plant and associated facilities with regard for essential wildlife areas, 2) adjusting work shifts to avoid feeding times of highly visible wildlife, 3) mass transportation of employees, 4) providing funds to State fish and game agencies to better control illegal shooting of wildlife, and 5) adopting a poaching clause in union contracts.

The amount of water withdrawn from the Yellowstone River for a gasification facility with off channel storage is not considered significant enough to affect fisheries. The cumulative increases in industrial, urban, and other water uses will dictate the severity of the impacts on fisheries. The cumulative impact will be addressed in the regional EIS to be prepared.

Cultural Resources

The South Wibaux-Beach tract area has not been inventoried to date. Information from existing inventories (BLM unpublished data, Davis 1976; Greiser 1980) outside the Fort Union coal region suggests that the predominant prehistoric sites should be lithic scatters of varying size, density and function (ca. 70-80%). Other expected prehistoric resources include stone circles (ca. 10%-20%), ceramic-bearing sites, rockshelters, and kill sites (ca. 10% combined). Expected historic resources include homestead and ranching remains (ca. 50%), historic grafitti and rock art (ca. 20%), freight roads, dugouts, cairns, trading posts, burials and battle sites (ca. 30% combined). Further information on cultural resource occurrence, distribution and significance cannot be quantified prior to inventory.

Visual Impacts

Eastern Montana and Western North Dakota have very high but common visual quality. In the absence of other types of visual experiences, the landscape is not highly valued as scenery because of the vast distances involved in crossing this relatively uniform area. Most highways roll with the landform so views alternate between nearby features at low points and panoramas of up to thirty miles at high points in the roadway profile. The landscape is seen in terms of these short vistas of landscape elements that will not be seen again, and short duration views of distant landscapes in which any vertical object or landscape feature serves as a focal point.

Large structural features in the regional landscape contrast with the landscape both in terms of the visual surface (the character of what is seen) and in terms of function. Vertical and linear components of a facility, because of hard architectural edges of the structures, and the transitory nature of panoramic views imply a visual importance of these large objects for orientation. The aesthetic response is secondary to this visual function.

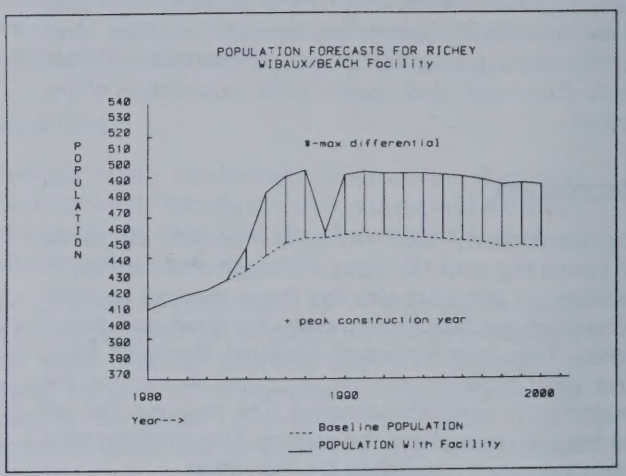
Neglecting cultural bias, the aesthetic response to stark architectural lines and pure planes of color contrasting with the simple curvilinear landforms of the countryside

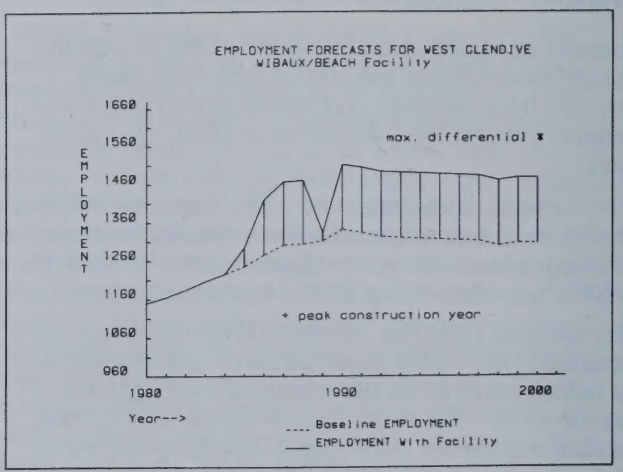
can be considered positive. This visual experience would be immediately comprehensible and would provide relief from a relatively uniform countryside. Beyond this initial response, however, are responses with origins in cultural bias and the individuals' relationships to the land. The greatest effect would be upon local residents with memories of the existing landscape to use as a comparative basis of judgment. If no attachment to the existing landscape is present, the facility would be judged more on its quality than on cultural bias.

The visual impact would be the penetration of the skyline by the facility in views from communities and major transportation corridors. The 500-foot stack could potentially be seen thirty or more miles away. The facility would be highly visible and would demand a response either positive or negative. The dominance of the facility in the landscape could be perceived as a loss of amenity through impairment of the landscape as it now exists for the forty years of the facility's expected life.

Economic and Social Conditions

Construction and operation of the South Wibaux-Beach facility would result in significant impacts upon services in communities within the area as a result of population growth associated with employment opportunities. Figure 3 shows forecasted community employment and population levels through the year 2000 both with and without development of the facility. As this figure shows, Richey, West Glendive, Glendive, Lindsay, Sidney, Lambert, Savage, Fairview, and Wibaux, Montana and Golva, Sentinel Butte, and Beach, North Dakota would experience significant increases in population and employment as the result of the development of the facility.





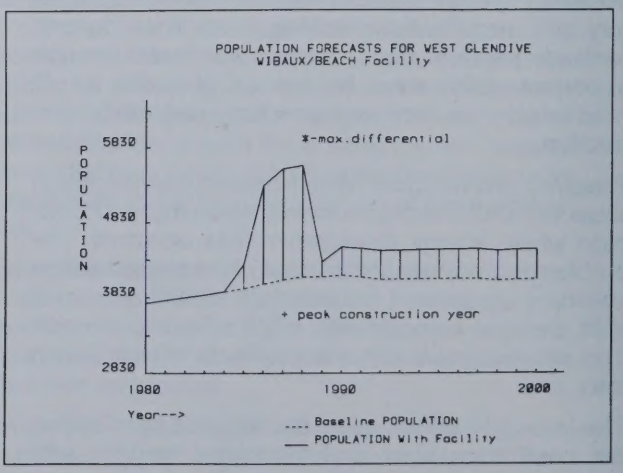
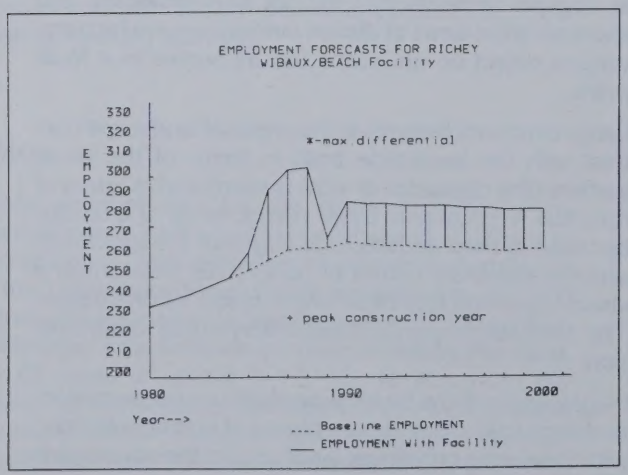
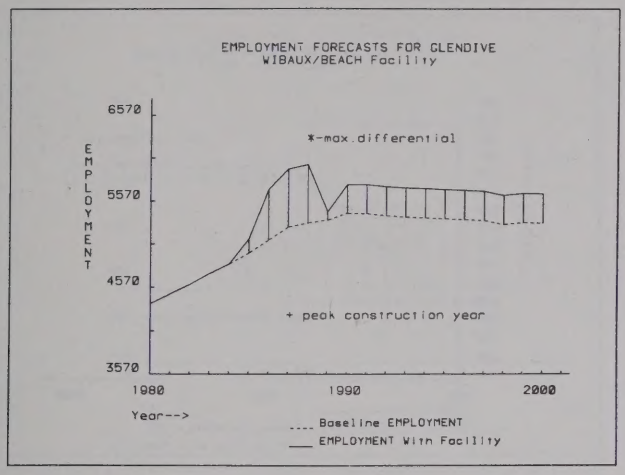


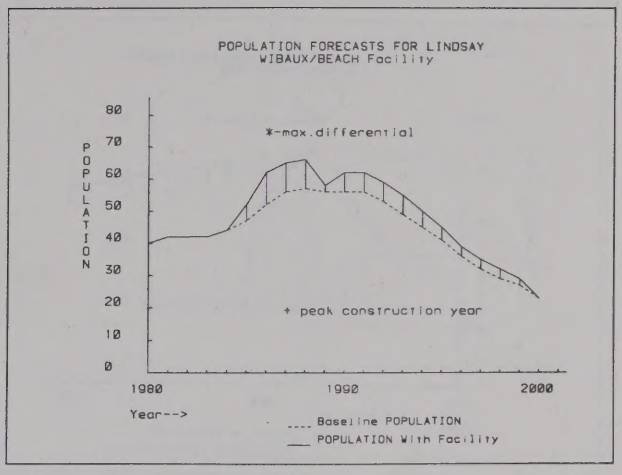
FIGURE 3

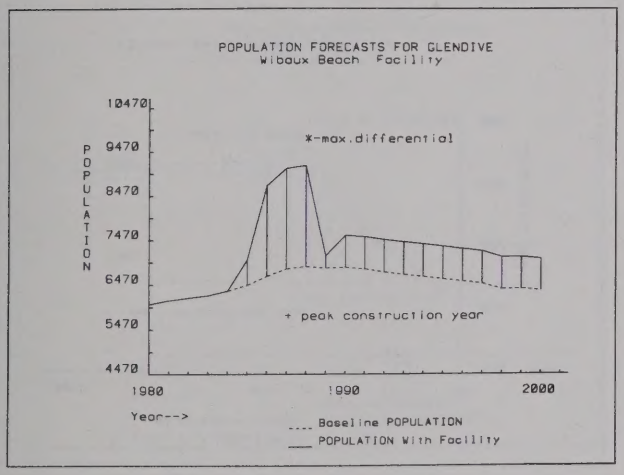


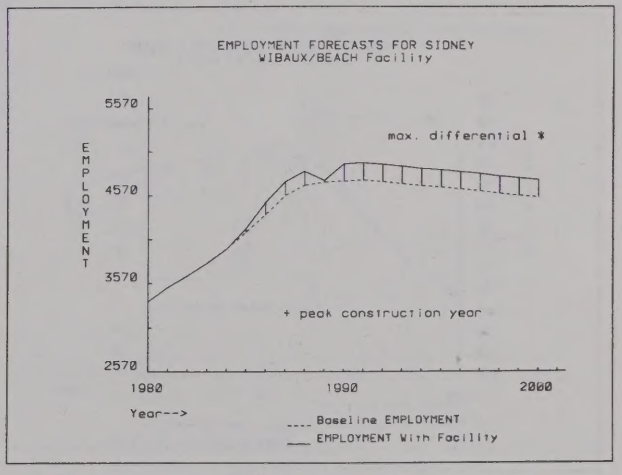
SOURCE: Mountain West Research, Inc., 1981

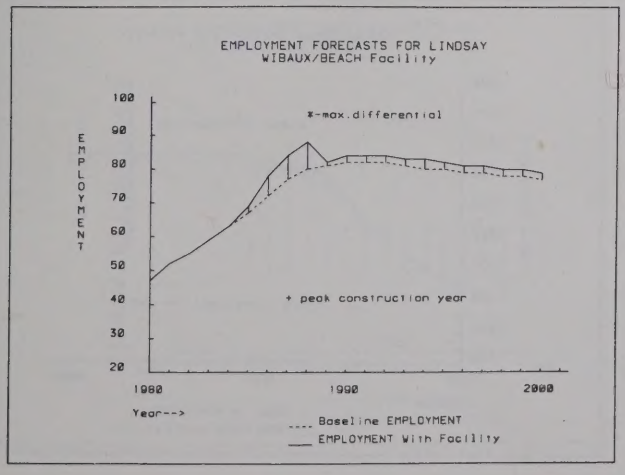
FIGURE 3 (continued)

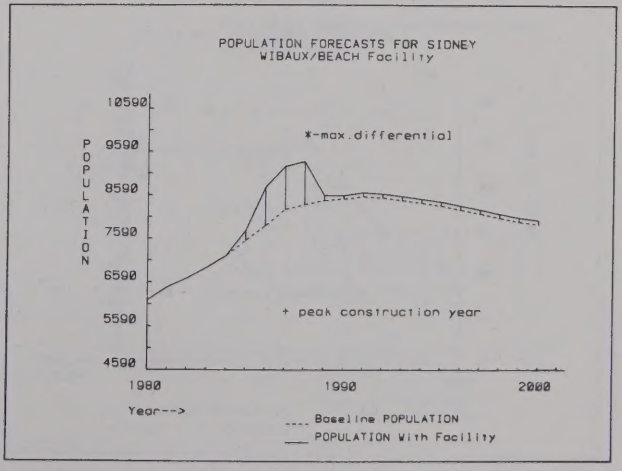






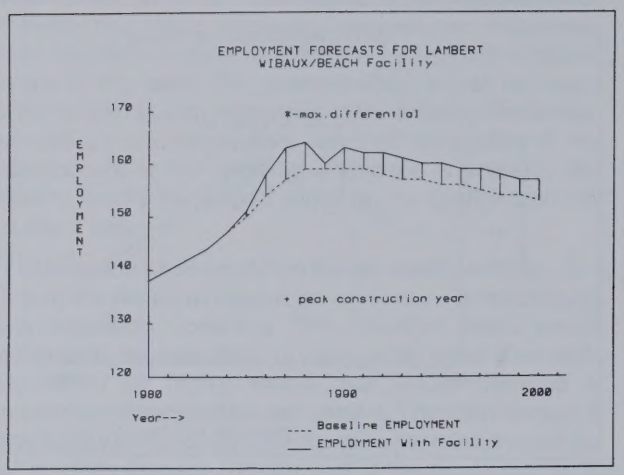


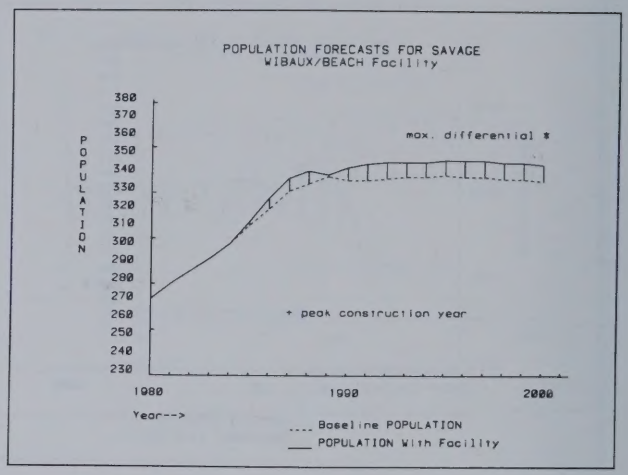


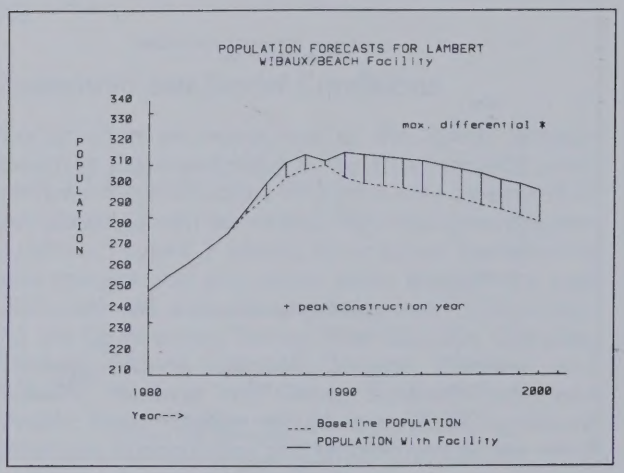


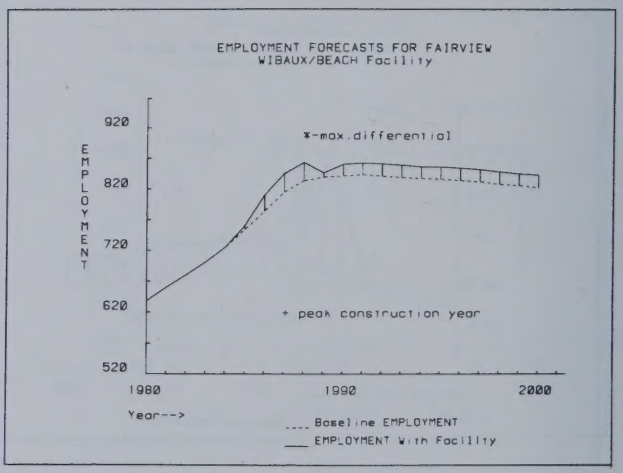
SOURCE: Mountain West Research, Inc., 1981

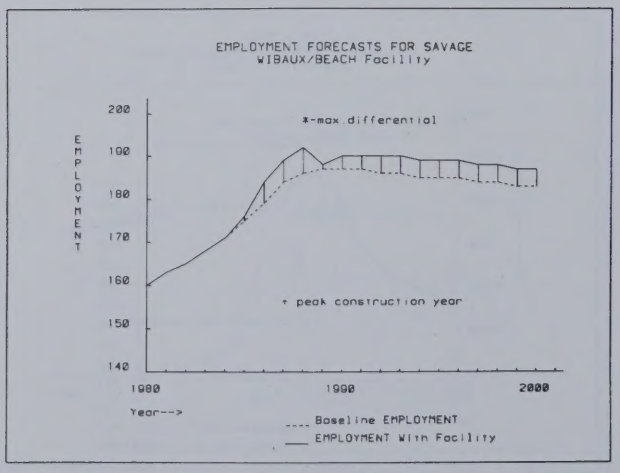
FIGURE 3 (continued)

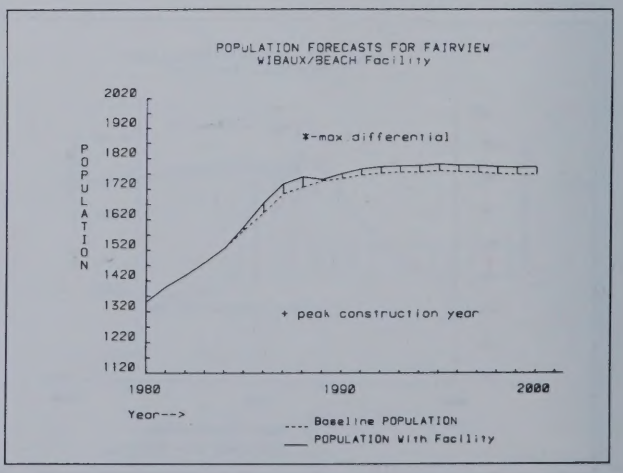






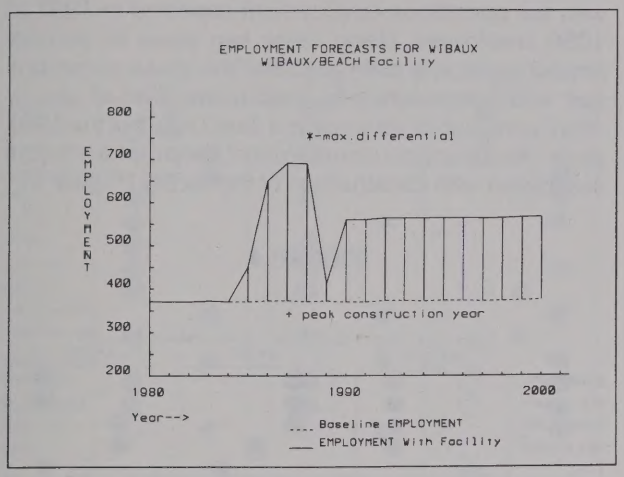


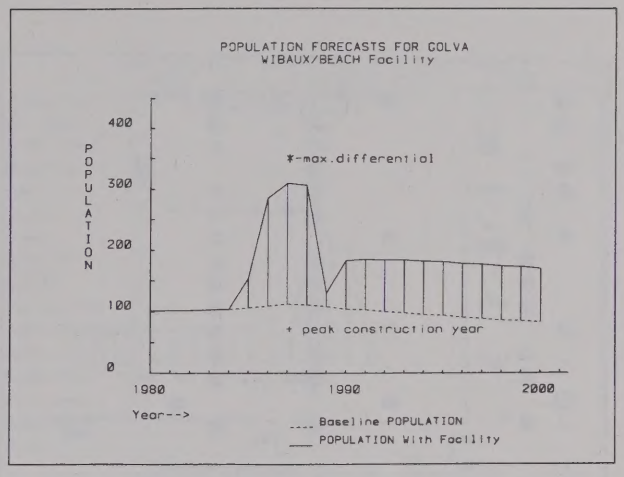


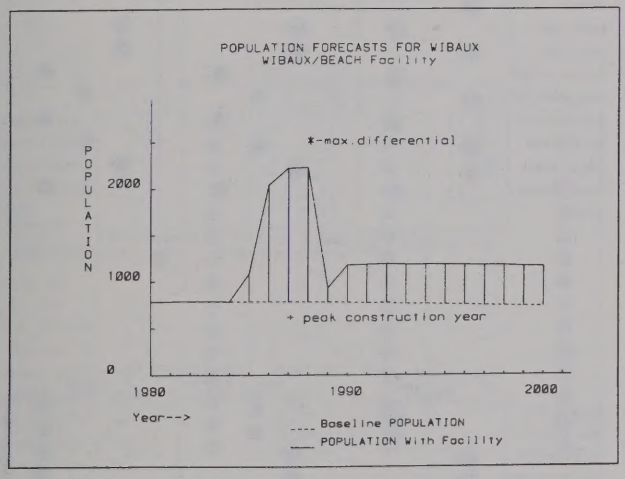


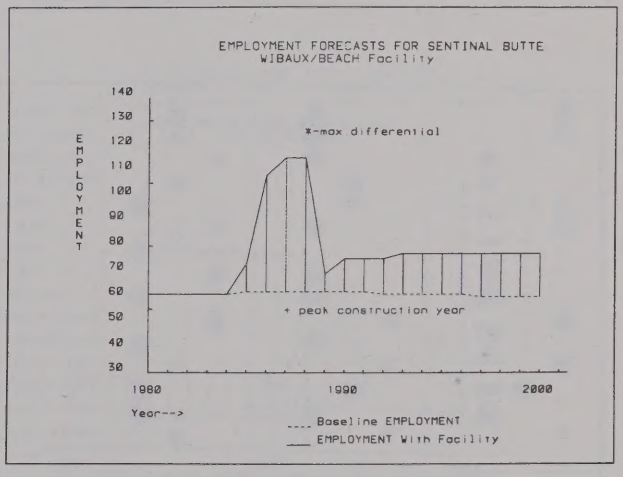
SOURCE: Mountain West Research, Inc., 1981

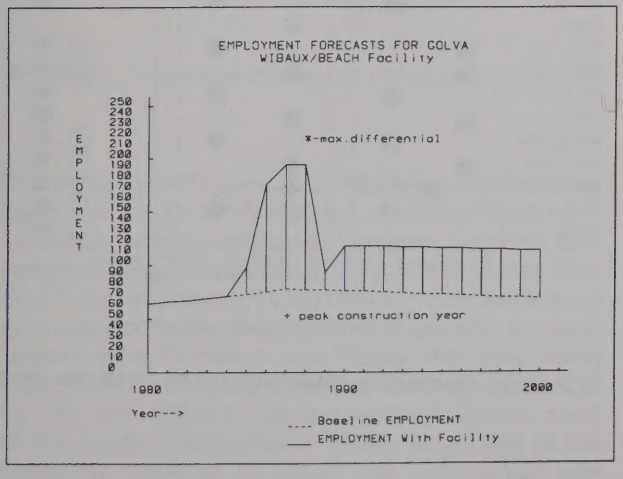
FIGURE 3 (continued)

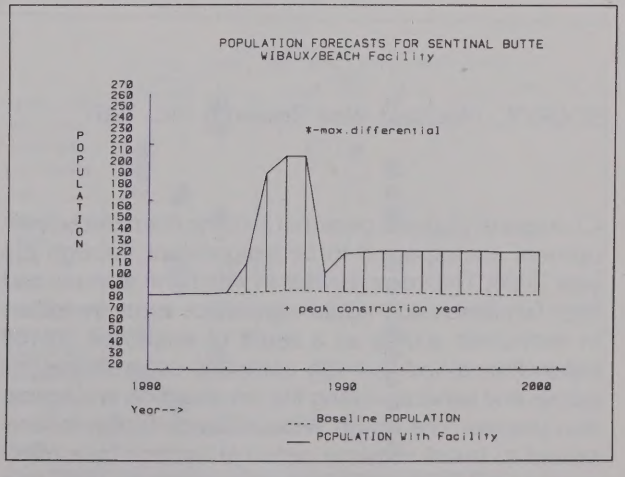












SOURCE: Mountain West Research, Inc., 1981

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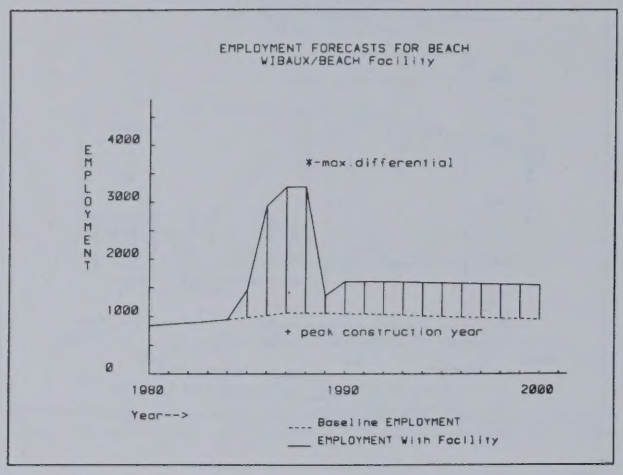
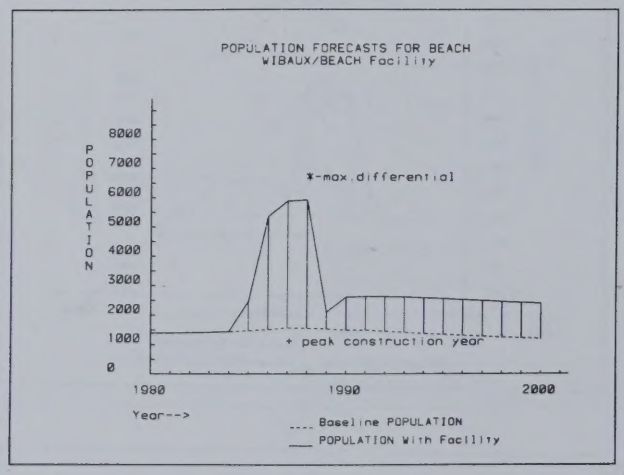


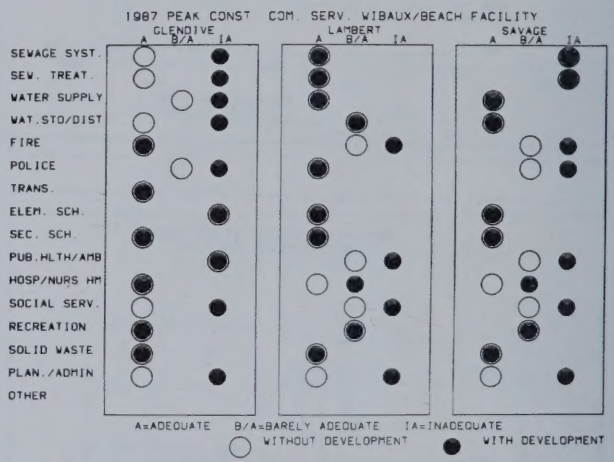


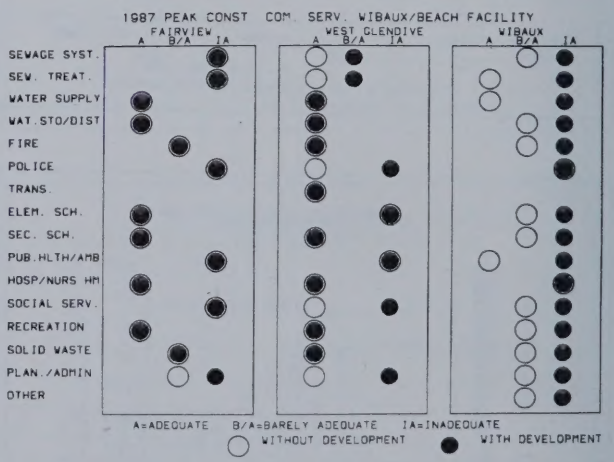
SOURCE: Mountain West Research, Inc., 1981

Changes in regional personal income from tract development are expected to be insignificant through the year 2000. The communities in which the workers and their families reside would experience some increases in economic activity as a result of employee payroll expenditures and through company expenditures for goods and services during the construction and operation phases. The South Wibaux-Beach facility is forecasted to boost regional personal income by a maximum of 4.7 percent over baseline values by 1987 as a result of expenditures associated with the construction phase of this facility.

Peak employment during the construction phase of the facility is expected to occur in 1987 at 3200 employees with full operations employment expected in 1991 at 1050 employees. Using these two years as primary impact dates, it is estimated that the above communities would experience an inadequate level of one or more community services as a direct result of the 1987 peak construction employment/population levels associated with construction of the facility (Figure 4).

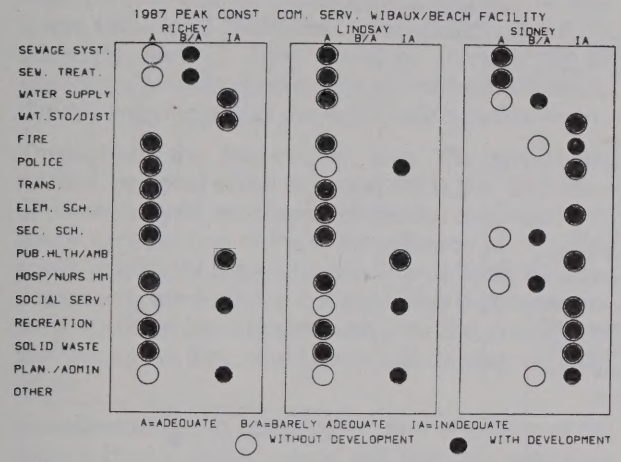
FIGURE 4

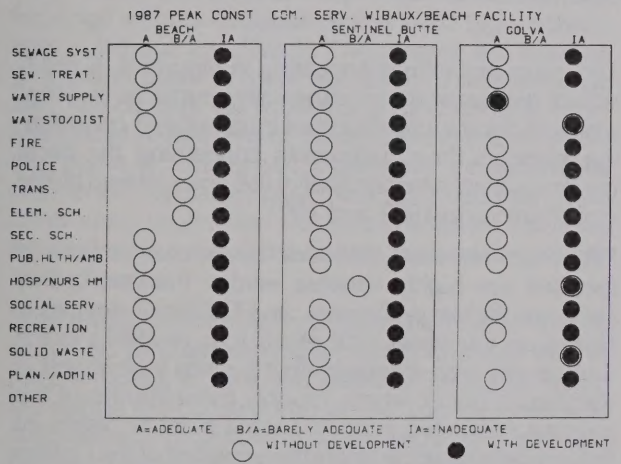




SOURCE: Respective city/county or regional planners

FIGURE 4 (continued)

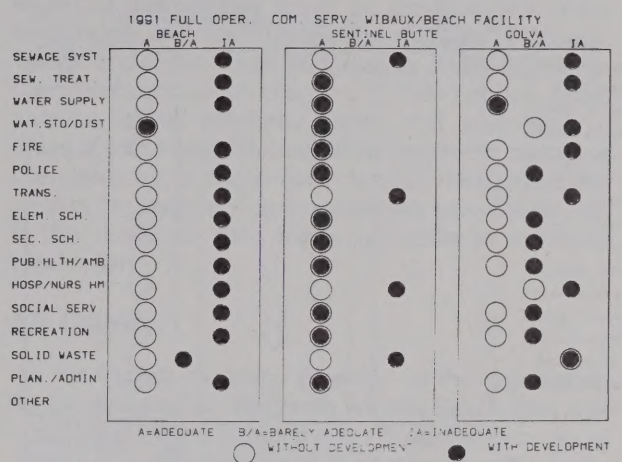


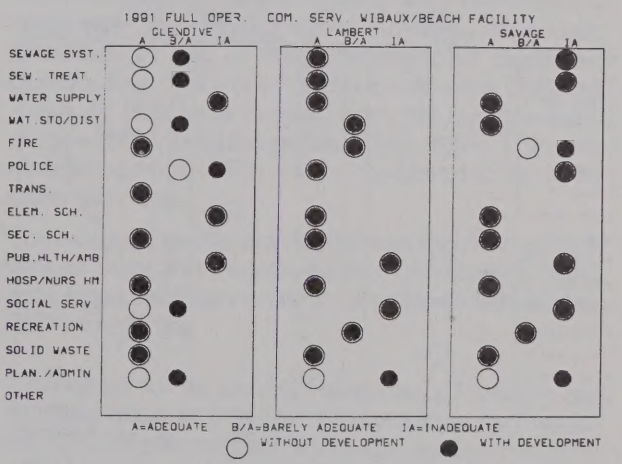


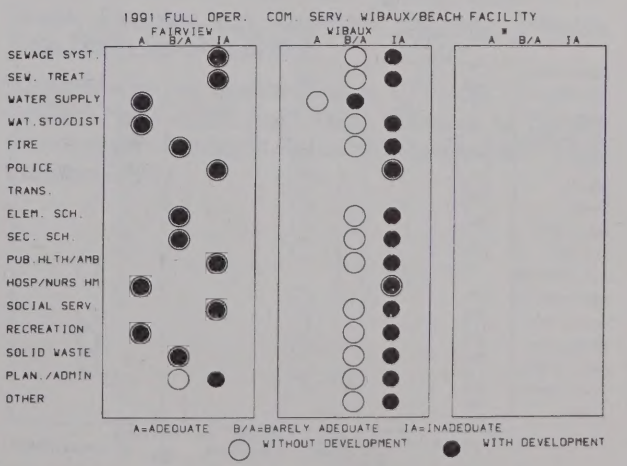
SOURCE: Respective city/county or regional planners

Population growth associated with full operation of the South Wibaux-Beach facility (i.e., 1999 and beyond) is expected to cause services in Glendive, Lambert, Savage, Fairview, and Wibaux, Montana and Golva, Sentinel Butte, and Beach, North Dakota, to be inadequate as a result of facility development (Figure 5). Lindsay, Sidney, West Glendive, and Richey, Montana would experience inadequacy of several community services by 1991 even without tract development. Development of the South Wibaux-Beach facility would add to the problems expected to occur. For comparison purposes, Figure 6 shows current (1981) community service adequacy assessments for impacted communities.

FIGURE 5

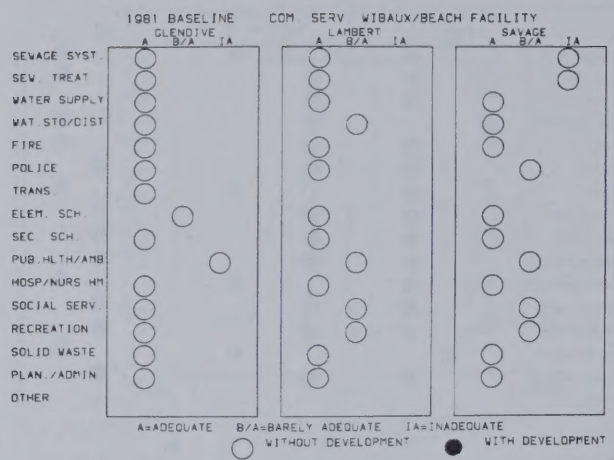


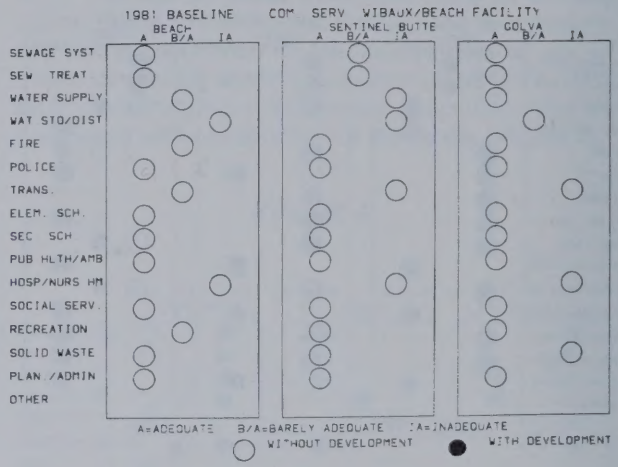


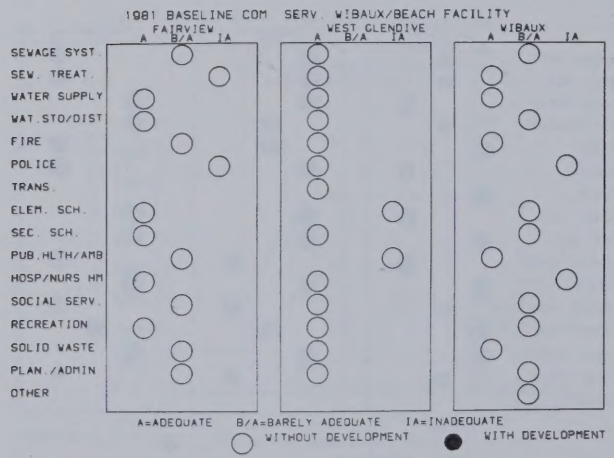


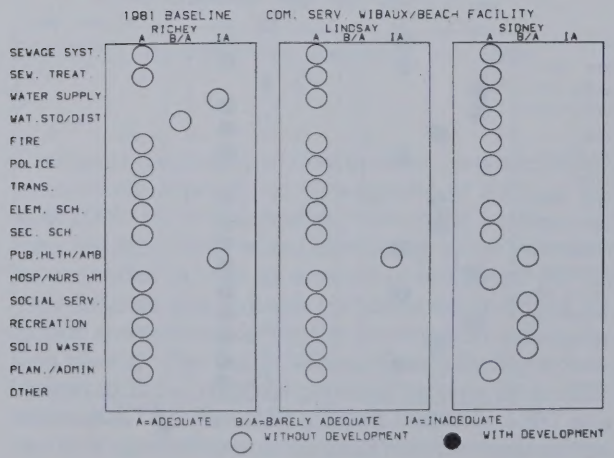
SOURCE: Respective city/county or regional planners

FIGURE 6









SOURCE: Respective city/county or regional planners

The adequacy ratings appearing in Figures 4, 5 and 6 reflect assessments by either city-county or regional planners for the communities involved and constitute the planners' best judgments concerning the fiscal (revenue/cost) situation likely to be encountered by the communities in 1987 and 1991.

Patterns of residents' attitudes toward coal conversion facilities are highly variable across the four-county (Wibaux, Richland, Dawson, and Golden Valley) area. Based on interviews with eighty-four residents in the four-county area, it appears that support is strongest in Richland County, where roughly three-fourths of the persons contacted support such a plant or plants. At the opposite extreme, more than one-half of the Golden Valley residents contacted expressed firm opposition to such a facility. Levels of support and opposition in Wibaux and Dawson counties fell between these two extremes, with a very small number of Wibaux and Golden Valley residents being contacted. Dominant concerns throughout the four-county area were possible effects of a facility on air quality and the local social consequences of rapid population growth.

Among leaders in the area, the level of support for an energy facility is quite high. Richland and Dawson County leadership expressed stronger support than officials in Golden Valley and Wibaux counties, where a diverse range of opinions on possible plant construction was evident. Officials in Wibaux and Golden Valley County were split in their orientations toward coal development.

Construction of the Wibaux-Beach facility would result in a variable distribution of benefits and costs among

present and future residents. Some persons clearly would benefit economically. Included are persons with energy job skills, persons who could acquire these skills, persons outside the labor force who want to enter it, and some local merchants. Other persons would be adversely affected. They would go through the experience of a rapidly changed social environment without directly enjoying any of the economic benefits.

Throughout the four-county area, the small-town, relaxed, personal social environment is the dimension of community life most appreciated by many residents. Since construction of the Wibaux-Beach plant would result, at least for the short term, in a radically different community atmosphere, it is very likely that these persons would be less satisfied with their communities of residence than they would be should development not occur.

Growth attached to construction and operation of the Wibaux-Beach facility would fall primarily into four communities; Glendive, Sidney, Wibaux, and Beach. The relative number of new residents (above that expected without development) is quite high, particularly in Wibaux and Beach. The present and baseline population bases in these two communities are quite low. The capacity for Wibaux and Golden Valley counties to absorb this level of growth during the construction phase is problematic. Both areas are agricultural with small population bases and have had little or no community experience with industrialization. Glendive and Sidney are somewhat better prepared to deal with such changes.

Structurally, Beach, Golva, Sentinel Butte, and Wibaux would go through significant social changes due to such a facility. Wibaux and Beach in particular would be, during the construction phase, communities with substantial disorganization, stress, and poor match-ups between resident needs and public services and facilities. Major deficits in such areas as law enforcement, education, social services, health care, and the like should be expected. Dealing with these problems will tax local and state officials.

Socially, long-term permanent residents would likely be buffered to some extent by established social networks, but the magnitude of the changes in Beach and Wibaux would be of such scale that avoidance of social problems due to rapid growth would be most difficult. In the long term, with an operational work force, it should be expected that stability would be reestablished in the four county area and only the communities of Wibaux, Beach, and Golva would likely display evidence of long-term, profound social changes. These changes, in the political, family, religious, leisure, and organizational areas of community life, would be persistent, changing the character of these communities throughout the term of the project. This would be due to a relative shift in the economic base from agriculture to industrial production.

Air Quality

An Air Quality Modeling Analysis[1] of the gasification facility assigned to the South Wibaux-Beach tract was conducted by the North Dakota State Department of Health. U.S. Environmental Protection Agency guideline models[2] (MTPER, PTPLU, PTMAX) were utilized. The projected air quality impacts were compared to applicable State and Federal Ambient Air Quality Standards as well as State Prevention of Significant Deterioration (PSD) of air quality increments. The three major air pollutants emitted from the facility—sulfur dioxide (SO_2), Total Suspended Particulates (TSP), and nitrogen dioxide (NO_2)—were compared to the applicable standards.

The assigned gasification facility was shown to comply with all State and Federal Ambient Air Quality Standards. It was also found to be in compliance with all State PSD increments.

[1]Guidelines for Air Quality Maintenance Planning and Analysis Volume 10 (Revised): Procedures for Evaluating Air Quality Impact of New Stationary Sources, EPA-450/4-77-001, October 1977, (OAQPS No. 1.2-029 R), U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711.

[2]Guideline on Air Quality Models, EPA-450/2-78-027, OAQPS No. 1.2-080, April, 1978, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711.

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The Nokota Company; Suite 112, Provident Life Building, Bismarck, North Dakota 58501.

The American Natural Resources Company, 1 Woodward Avenue, Detroit, Michigan 48226.

Final Environmental Impact Statement for the Great Plains Gasification Project, Mercer County, North Dakota. Prepared by the U.S. Department of Energy. August 1980.

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Montana Energy Almanac. Prepared by the Montana Department of Natural Resources and Conservation. October 1980.

West-Central North Dakota Regional Environmental Impact Study on Energy Development. Prepared by the U.S. Department of the Interior, Bureau of Land Management and the State of North Dakota. October 1978.

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Montana Department of Natural Resources and Conservation; Helena, Montana.

The Tenneco Coal Gasification Company; P.O. Box 491, Glendive, Montana 59330.

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